University of Alberta

Poverty and Childhood Injury

by

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ABSTRACT

The overall purpose of this thesis was to examine the relationship between poverty and childhood injury. The first paper provides a systematic review of the literature. Significant understanding of the relationship remains to be addressed. The second paper provides a secondary analysis of data from Alberta Health and Wellness, examining the relationship between socio-economic status and childhood injury. The third paper provides results of a survey conducted at the Stollery Children's Hospital in Edmonton, which examined parental perceptions of the risk of childhood injury and the use of safety measures. Results from the secondary analysis show there is a relationship between lower socio-economic status and certain childhood injuries, for example, more superficial injuries and open wounds. Results from the survey indicate that socio-economic status was not related to parental perceptions of risk factors for childhood injury. Implications of these findings are presented along with suggestions for further research and policy.

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LIST OF ABBREVIATIONS

AHCIP	Alberta Health Care Insurance Plan
AHW	Alberta Health and Wellness
CHIRPP	Canadian Hospitals Injury Reporting and Prevention Program
ICD	International Classification of Diseases
LICO	Low-Income Cut-Off
MVC	Motor Vehicle Collision
SARS	Severe Acute Respiratory Syndrome
SES	Socio-Economic Status
SPSS	Statistical Package for Social Sciences
WHO	World Health Organization

CHAPTER 1 - INTRODUCTION

Overview

With the advent of effective sanitation programmes, a clean water supply, and the introduction of antibiotics and immunisations, the last century witnessed an improvement in the health of children in Canada. Today, unintentional childhood injuries are recognised as a major health problem and the leading cause of death in children and youth less than 20 years of age in Canada, especially among First Nations people (Health Canada, 1997). As a determinant of population health, poverty, or more precisely, income inequality, has been linked to poor health status, not only in Canada but globally. Unfortunately, the relationship between poverty and unintentional childhood injuries has not been extensively researched. This thesis was designed to fill this gap in the literature.

Statement of the Problem

The frequency of childhood "accidents" was recognised as a health concern in England in the 1950's when the mortality rate from road accidents was found to be 15 times higher than that from poliomyelitis in 1956. An early article (Backett, et al., 1959) proposed that children from "vulnerable" families were more at risk of experiencing injuries. These authors found that important correlates of childhood injury were family illness, parental supervision, and play facilities. Crowding was deemed less important, as were family size and child intelligence. Backett and colleagues concluded that: "In striking contrast to poliomyelitis, road accidents to children arouse little popular attention and have stimulated almost no research" (Backett, et al., 1959, p.409). Over forty years later in Canada, despite the high mortality and morbidity rates associated

with childhood injuries, infectious diseases, such as meningococcaemia and severe acute respiratory syndrome (SARS), continue to arouse popular attention, possibly at the expense of childhood injuries.

What is a "vulnerable" family? Not all families who experience poverty are vulnerable to childhood injuries. For example, some children have only transitory contact with poverty because of a temporary spell of economic hardship experienced by the parents, for example during the time their parents are students, or during divorce or temporary unemployment. Bradbury et al. (2000) argue that "a long period (or repeated shorter periods) of low living standards can be expected to have a greater impact on a child's development and future life chances than an isolated short period" (p.5). Moreover, it is recognised that it can be hard to distinguish between the "near poor" and those living in poverty as the near poor may be worse off than the poor because they do not qualify for subsidies.

Notwithstanding these definitional issues, there is evidence that growing numbers of Canadian children live in poverty. In 1995, 24% of Canadian children (an estimated 1.3 million children under the age of 15 years) fell below the low-income cut-off (LICO). LICO refers to situations where families spend more than 54.7% of their income on food, shelter and clothing. About 60% of Aboriginal children under six years of age in 1995 lived below the LICO. Statistics Canada has stated that LICO's are different from measures of poverty but in the absence of an accepted definition of poverty, LICO statistics have been commonly used as a method of studying this relatively deprived population (Health Canada, 1999). According to a report entitled 'Toward a Healthy Future: Second Report on the Health of Canadians' (1999), the

United Nations in 1990 introduced a concept of "human development" that measured life expectancy, education and standard of living, Canada has been ranked first in the last two reports. However, when further measures were introduced, such as the Human Poverty Index-2 which measures the way poverty is manifested, Canada ranked 10th out of 17 industrialised countries. The Government of Canada's 1989 resolution to eliminate child poverty by the year 2000 has clearly failed.

The relationship between poverty and childhood injuries is complex, and there are many possible ways that poverty and childhood injury could relate to each other. For example, low income can lead to living in a less safe neighbourhood with fewer parks and more industrial development. Low-income housing may be associated with environments that promote injuries, such as greater traffic densities, broken playground equipment, broken glass, drug activity, prostitution, violence, and firearms. Alternatively, one's place of residence may be in a poor state of repair with fewer safety features, such as, smoke detectors, poorer heating equipment, and overcrowding. Parental unemployment can lead to low-income and family stress, with the possibility that these factors may affect the supervision of children. Low levels of parental education may lead to less awareness of the developmental stages of childhood; such parents may have fewer abilities to protect the child from the environment. Lone parenting can lead to a decreased ability to provide the child with the same supervision as two parents. Additionally, higher stress levels and social isolation associated with lone parenting, can progress to depression. Teenage parents may have a lack of knowledge about the inherent dangers of inadequate supervision of their children and often live in poverty.

All of these mechanisms may link poverty and childhood injury; however, as the literature review provided in Chapter 2 will show, very little empirical research has attempted to sort out the nature of this relationship. Thus, the next chapter will review the literature pertaining to the relationship between poverty and childhood injuries in the first 16 years of life, and will also examine the literature on parental attitudes and beliefs about childhood injuries and the safety measures taken by parents. This literature review provided the basis for two empirical studies designed to answer the following research questions.

Research Questions

The purpose of the research reported in this thesis is to describe the rates of injury among children of different socio-economic status, and in addition, parental perceptions of childhood injury.

The research questions investigated in this study were as follows:

1. What is the relationship between childhood injuries and the child's socio-economic status in Alberta?
2. Are children of lower socio-economic status more likely to present for a physician consultation with an injury than those of higher socio-economic status in Alberta?
3. Are there differences in the number of childhood injuries of those living in rural and urban Alberta?
4. Are there differences in the number of childhood injuries of those living in the two major cities in Alberta, Edmonton and Calgary?
5. What are the most common parental perceptions of the risk factors for childhood injury?

6. What safety measures do parents use to prevent childhood injuries?
7. What is the relationship between selected SES indicators and parental perceptions of risk factors for childhood injury and safety measures taken by parents?

Summary

Findings from this study will provide insight into the relationship between poverty and childhood injuries, and parental perceptions of the risks of childhood injury and the use of safety measures. The following three chapters are complete within themselves yet each contributes to the overall view of poverty and childhood injuries. Finally, the last chapter examines the links between the two studies presented in Chapters 3 and 4, and implications of the study are discussed with a view to further research questions and possible preventive strategies that could be explored to address the issue.

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Running head: POVERTY AND CHILDHOOD INJURY

Chapter 2 - Paper I

Poverty and Childhood Injury: A Systematic Review of the Literature

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Chapter 2

Poverty and Childhood Injury: A Systematic Review of the Literature

As Canada enters the new millennium, reducing inequalities in health status remains a challenge to achieving population health. Compared with other developed countries Canadians have a high standard of health. However, unintentional injuries are the leading cause of death, morbidity and permanent disability among children and youth in Canada. It is apparent that income inequality can be linked to poor health status, one cause of which is childhood injury.

The protection of children from injury ultimately depends on adults committed to reducing injury: parents, teachers, engineers, and legislators. Knowledge of childhood injury risk does not ensure that parents will enforce preventative measures. Additional factors may be part of the injury equation. Socio-economic variables may be a predictor of the perceptions of childhood injury and the use of safety measures. Baker et al. (1992) concluded that childhood deaths from motor vehicle accidents are more prevalent in low-income families. Is this the result of different driving practises, for example, indifferent use of, or inadequate number of seatbelts, using the back of a pick-up truck to transport people, or not owning the appropriate child restraint because the cost is prohibitive? This factor needs to be investigated.

Purpose of the Paper

The purpose of this paper is to address the issues surrounding poverty and childhood injury by systematically reviewing recent literature on (a) the relationship between poverty and childhood injuries, and (b) parental attitudes and beliefs on childhood injuries and the safety measures taken by parents.

Method

An initial search using the electronic database Medline was conducted for all articles from 1980 to the present time published in the English language. To obtain the most recent research 1980 was chosen as the cut off date. Keywords included in the search were: wounds, injuries, accidents, child, socio-economic factors, social class, parental income, and educational status. The literature search used the following search strategy. Initially three main subject headings "wounds", "injuries" and "accidents" were exploded and OR was used to include all possible articles. This was then combined with the exploded term "child" using AND. Further main subject headings, "socio-economic factors/ or social class", "educational status/ and parents", and " income" were exploded and OR was used. These results were combined with the previous combination using AND. The final search was then limited to 1980-2003 and English language. This was then extended to additional electronic databases, EMBASE (1980 until March 2003), and CINAHL (1982 until March 2003) again using the same search terms. In addition, *The International Journal of Injury Prevention* was manually reviewed from its conception in March 1995 until March 2003.

This process yielded 198 references from the electronic journal search and 9 additional articles from the hand search. Each abstract was reviewed individually. Abstracts were excluded at this stage if they: (1) collected data prior to 1980 (e.g., Langley et al., 1983; Wadsworth et al., 1983; Golding, 1983; Wicklund et al., 1984; Gallagher et al., 1985; Schor, 1987; Bijur et al., 1988; Ostberg et al., 1991), (2) used research methods that did not include a measure of socio-economic status (SES) (e.g., Horwitz et al., 1988; Joffe, et al., 1991; Cummings et al., 1994; Harris et al., 1994;

Swigonski, 1995), (3) focused only on lack of medical coverage health insurance (e.g., Overpeck et al., 1995; Mott, 1999), (4) focused primarily on race as a determinant of health (e.g., Berger et al., 1989; Overpeck et al., 1997; Hussey, 1997; Agran et al., 1998; Anderson et al., 1998), (5) focused on children greater than 14 years of age, as the picture of injuries becomes complicated due to the child's greater personal autonomy, development of risk behaviours, less geographic restrictions and young people driving vehicles. Inclusion criteria for the final review were that (1) the article was a scientific study of childhood injury in relation to SES, or (2) the article focused on parental perceptions of injury risks. Both qualitative and quantitative studies were eligible for inclusion, as were studies conducted in developed countries around the world.

A total of 32 articles met the first criteria for inclusion (see Appendix A). Each article was tabulated and coded using the following categories: country of origin, author(s) and article purpose, sample characteristics, design of the study and sample size, SES indicators, and the main findings reported in the study. Fourteen articles on parental perceptions of injury risks met the second criteria for inclusion (see Appendix B). Each article was tabulated using the following categories: author(s) and article purpose, country of origin, design of the study and sample size, parental beliefs and attitudes, use of safety equipment and knowledge, SES indicators, and the main findings reported in the study.

Results

The literature recovered from the search process was organised according to two issues, namely the relationship between poverty and childhood injuries, and parental perceptions of the risk of injury and safety measures taken to prevent childhood injury.

Overview of the Studies

Seven Canadian studies of childhood injuries associated with SES were found during the literature search, representing 21% of the pertinent literature on this topic. Three of the studies (Dougherty et al., 1990; Joly et al., 1989; Pless et al., 1987) examined traffic injuries and/or deaths in the Montreal area. Two others looked at risk factors for childhood injuries in the Ontario and Montreal areas (Faelker et al., 2000; Larson et al., 1988). One study examined multiple risk behaviours and other social factors of injured Canadian youth (Hapgood et al., 2001). The final Canadian study examined childhood injury rates in Manitoba during a five-year period (Brownell et al., 2002). The international studies uncovered in the search examined all childhood injuries.

Only fourteen articles investigated parental attitudes and safety awareness of childhood injuries. Two articles were of Canadian origin (Root, 1996; and Alberta SAFE KIDS Campaign, 1994). The other studies were conducted in the USA and Europe.

SES Indicators

SES is a multidimensional construct. Last et al. (1998, p.234) define it as "a descriptive term for a person's position in society. It can be classified in many ways and is often expressed on an ordinal scale using such criteria as income, educational level, occupation, and the real estate value (based on realty taxes) of the residence." Articles reported many different measures to operationalize SES; the most common were family income, levels of parental education and employment status. These measures were often supplemented by sociodemographic measures, including: the type of domicile, length of

residence in the neighbourhood and crowding (e.g., Rivara et al., 1985), marital status and lone parenthood (e.g., Larson et al., 1988), number of children in the household (e.g., Ueland et al., 1996), ethnic background, (e.g., Glik et al., 1991), and maternal age (e.g., Scholer et al., 1999). A measure frequently used in British articles was the Townsend score, which takes into account unemployment, car and home ownership, and overcrowding (Hippisley-Cox et al., 2002; Lyons et al., 2000; Reading et al., 1999; Laing et al., 1999; and Kendrick et al., 1997). Another scale used in epidemiological studies is the United Kingdom's Registered General's Occupational Classification; this has been adapted for use in other countries, for example, Israel (Gofin et al., 1993). North American articles often base their estimates of SES on census tracts that are ranked by median household income (e.g., Faelker et al., 2000; Dougherty et al., 1990). This diversity indicates that there is no common denominator used to describe SES in the articles selected for review.

Relationship Between SES and Injury

Studies investigating family income and childhood injuries yielded inconsistent findings. Health Canada's publication of 'Unintentional Injuries in Childhood: Results from Canadian Surveys' (2000), concluded that there was "no apparent relationship between reported injuries and income adequacy" in children aged 0 to 11 years (p.55). This conclusion was mainly based on a study performed in Montreal by Larson et al. (1983), which found that there was no relationship between increased risk of childhood injury and lower family income, and Kogan's et al. (1995) study that concluded that the risk of reported injury was higher for children whose household income exceeded $20,000. Despite these results, the majority of other studies in the review report that

low-income or poverty are a risk factor for childhood injuries (Brownell et al., 2002; Faelker et al., 2000; Durkin et al., 1998, 1994; Dougherty et al., 1990; Pless et al., 1987; and Rivara et al., 1985). Dougherty et al. (1990) examined motor vehicle accidents (MVA's) and injuries to Montreal pedestrians and bicyclists, and concluded that rates of injuries increased consistently with poverty. These results are consistent with Faelker et al's. (2000) findings that children living in the highest poverty levels experienced higher non-fatal injury rates than those in the lowest poverty levels. These inconsistent findings demonstrate that further Canadian research is needed.

Five studies cited reported a significant positive relationship between parental education and risk of childhood injury (Pomerantz et al., 2001; Scholer et al., 1999; Stevenson et al., 1995; Durkin et al., 1994; Bourguet et al., 1989). However another three studies did not conclude that parental education had a bearing on childhood injuries, (Addor et al., 1995; Kogan et al., 1995; and Larson et al., 1988). Again, these inconsistencies need further investigation.

Employment status was repeatedly used as an SES indicator. It was measured using: unemployment rates (i.e., any study using the Townsend deprivation index, e.g., Hippisley-Cox et al., 2002), mother or father's occupation, (e.g., Addor et al., 1995), or occupational class (e.g., Roberts, 1997). The majority of studies that used the Townsend deprivation index concluded that risk of injury was positively related to social disadvantage. There were inconsistencies in the studies using parental occupation as an SES indicator; Addor et al. (1995), did not conclude that lower maternal employment was a risk for reported child injury, however this was one of the associations between SES and childhood injury cited by Durkin et al. (1994), Bourguet et al., (1989), and

Larson et al. (1988). Occupational class was consistent in determining an increased risk in injuries in the lower classes (Roberts et al., 1997; Gofin et al., 1993).

There appear to be inconsistencies with the sociodemographic term maternal age in the studies covered by the literature review. Taylor et al. (1983) reported that there were significant differences between teenage and older mothers in the incidence of "accidental poisonings, burns and superficial injuries or lacerations". All these injuries were likely to occur in the home and be related to inadequate child supervision. Scholer et al. (1999) support this interpretation and concluded that maternal age (<20years) was a factor in high infant injury deaths compared with mothers older than 30 years of age. However, Siegel et al's. (1996) study in Colorado demonstrated that the 20 to 24 age group also affected the rate of unintentional infant injury mortality and that teenage motherhood was only a risk for intentional injury. These findings bear further investigation.

Relationship Between SES and Parental Attitudes to Childhood Injury

Most of the articles examining parental attitudes and safety awareness in relation to childhood injuries concluded that parental perceptions of risks and hazards were often inaccurate. This was evident especially in families living in poverty where their knowledge of "accidents and prevention measures was limited and often inaccurate" (Colley, 1994, p.834). A survey by Eichelberger et al. (1990) found that parents of lower SES underestimate the risks of injury to their children, especially burns and poisonings. This is supported by Root's (1996, p.9) survey where it was found that low SES parents "were generally unaware that injuries were the number one cause of death among children". However, this is disputed by Glik et al. (1991) who concluded that lower

income families were not less aware of threats to their child's safety and that they may be more familiar with childhood injuries. Furthermore, Rivara et al (1989) highlighted a survey performed in England where the majority of parents, teachers, and police officers place the blame and responsibility for pedestrian injury on the child.

Evans et al's (1997) study suggested that there is a more complex range of variables associated with parental attitudes of child home safety issues. Their research showed similar attitudes towards home safety among parents living in more affluent areas and those living in less affluent neighbourhoods. The differences noted involved the people living in the less affluent area having perceptions of decreased neighbourhood safety and lack of money to keep their child safe. This study presents more questions for further investigation.

Study Design

Most of the information obtained from the literature search about how poverty affects childhood injuries has been from studies that have compared individual level health information with measures of socio-economic characteristics of the area of residence (e.g., Pless et al., 1987; Dougherty et al., 1990; Lyons et al., 2000). By using census or survey information, household income is used to classify individuals according to SES, (Locker et al., 1996). The median household income of the enumeration area is usually regarded as an estimate of the SES of that area. This form of coding may be fairly accurate in urban areas but may not differentiate levels of SES in rural areas served by a rural post office. Additionally, an aggregate measure may not be accurate as a proxy for individual level measure. Ideally, to assess the individual SES and relate it to health concerns, access to longitudinal data that encompasses the

individual, social and economic status, health status and utilisation of healthcare resources as well as the economic and physical environment of the individual home and place of employment should be collected (Frolich et al., 1996).

Individual level information was obtained in studies of parental attitudes of childhood injuries, the majority utilising postal or telephone survey techniques (e.g., Evans et al., 1997; Glik et al., 1991). However, Sparks et al. (1994) and Colley (1994) expanded this level of information by performing in-depth interviews to obtain information about parental attitudes about childhood injuries and the use of safety equipment and safety knowledge.

Type of Injury Studied

The majority of articles on childhood injuries associated with SES examined any childhood injury (n=24). The other studies cited concentrated more on specific childhood injuries; such as pedestrian and/or cyclist injuries (Dougherty et al., 1990), motor vehicle collisions (MVC) (Pless et al., 1987), fractures (Lyons et al., 2000), recreational injuries (Ni et al., 2002), and head and spinal injuries (Durkin et al., 1998). Studies that concentrated on a specific injury-producing cause were aimed at suggesting a particular preventative measure; for example, Dougherty et al. (1990) concluded that a reasonable preventative strategy involved environmental changes to reduce injuries. Conclusions from studies on general childhood injuries suggested locally applicable safety agendas for children: for example, Laing et al. (1999). Both strategies have merit.

The majority of the articles about parental beliefs and attitudes of childhood injuries, and the use and knowledge of safety equipment, examined any childhood injury (e.g., Sparks et al., 1994). Studies that concentrated on preschool children tend to

examine injuries in the home: for example Evans et al. (1997) and Colley (1994). Only Rivara et al. (1989) looked at parental attitudes and practices on a specific childhood injury, that of pedestrians. This study was aimed as a guide for prevention programs.

Quality of the Studies

The quality of the studies covered in the literature review was assessed by examining the strengths and weaknesses of the sample and design used by the researchers.

Strengths. The studies that examined large population based databases gave the reader a more comprehensive view of the relationship between SES and childhood injury (e.g., Brownell et. al., 2002; Hippisley-Cox et. al., 2002; Pomerantz et. al., 2001). The strength of the study was increased when this was combined with a population that looked at the full age range of the child (e.g., Brownell et. al., 2002). Further, a study that examined a large proportion of the paediatric population in a country presented an overall picture of the relationship (e.g., Roberts, 1997). A more comprehensive view of the relationship between SES and parental perceptions of childhood injury was obtained when in-depth interviews were performed (e.g., Gielsen et. al., 1995; Sparks et. al., 1994).

Weaknesses. Despite finding 46 studies in this literature review meeting the inclusion criteria, few of the studies primarily examined the relationship between SES and childhood injury. Other confounding factors were often incorporated into the study, for example, ethnicity. These provide an opening for biases. Multiple measurements of SES factors in some of the studies again weakened the evidence of a relationship and in some cases provided conflicting results, for example, Larson et al's (1988) study. One of

the main weakness noted in the studies reviewed was that few studies examined all childhood injuries that were seen by healthcare professionals (e.g., Ni et. al., 2002), most only examined hospitalisations and/or mortalities (e.g., Ness et. al., 2002; Scholer et. al., 1999). Another possible weakness in some studies is that only specific injuries were examined (e.g., Lyons et. al., 2000), or that the location of the study was restrictive (e.g., Larson et. al., 1988). The majority of the studies had large databases when the relationship between SES and childhood injury was examined, however, a few may produce biases due to small sample sizes (e.g., Carter et. al., 1993). When investigating injury as a means of prevention, it is often impossible to perform experimental designs; therefore weaker evidence is most often extracted from cross-sectional, case-control and historical cohort designs. Further, when case-control studies with low numbers are examined the results must be interpreted with caution (e.g. Bourguet et al., 1989). Any retrospective survey that relies on parental memory has the possibility of recall biases (e.g., Kogan et. al., 1995). In addition, postal surveys are open to self-selection bias among the respondents (e.g., Evans et. al., 1997).

In conclusion, the quality of the studies that examined SES and childhood injury was not high.

Discussion

On balance, this literature review has uncovered a large body of literature pertaining to poverty and childhood injuries. However, it has been difficult to draw any definitive conclusions about the relationship between poverty and childhood injury because of discrepancies in the population studied and inconsistencies in the way SES was measured by different research teams. The initial challenge is that Canadian data are

scarce. When relying on data from other countries to make conclusions (e.g., United States), other variables come into play, for example, the absence of universal Medicare, and the exposure to different risks, such as guns. Secondly, British data may be comparable when it comes to accessing universal healthcare facilities, however it does not portray an accurate picture of Canadian rural life with its vast land mass or its relatively small population. Consequently, Australian data is probably the most comparable to Canadian circumstances with its universal healthcare system, large landmass, relatively small population and presence of an indigenous people where poverty is an important issue.

To obtain a more accurate picture of Canadian people living in poverty and the incidence of childhood injury, certain fundamental issues need to be explored. First research is required to compare rates of injury of rural children living in poverty to urban children. This issue has received very little attention from researchers in the area. Sparks et al (1994) compared a deprived urban area with a relatively affluent semi-rural area in Britain; however, this study did not exclusively concentrate on the differences between rural and urban rates of injury as the SES of both areas were significantly different. Carey et al. (1992) investigated variations in the incidence and patterns of child mortality in New South Wales by geographic region and SES. Their study concluded that the injury rate was significantly higher in the rural area compared to the metropolitan area. Brownell et al. (2002) examined regional differences in rates of childhood injury in Manitoba; their findings indicated significant rural-urban differences especially when comparing northern Manitoba's rates with the rest of the province.

Additionally, performing comparisons between two cities in Alberta may demonstrate a difference in childhood injuries among people living in poverty. Edmonton and Calgary fall under the jurisdiction of different healthcare authorities and consequently different budgets and healthcare priorities. This type of comparison was not found in this literature review and could present further research questions.

Finally, there appear to be few research studies in Canada that have examined parental beliefs and attitudes about childhood injuries and the use of safety measures. Further research may help to bridge this gap in our knowledge and lay a basis for preventative measures that can be adopted by the community.

In conclusion, childhood injury is being recognised as an important public health issue in Canada. The recognition of the importance of injury prevention continues to grow. To achieve the most effective prevention programmes sufficient knowledge and understanding of the various issues especially SES, need to be examined. Overall, the majority of the literature uncovered in the review was methodologically weak and subject to biases. The various measures of SES used in the studies have made it difficult to draw any definitive conclusions about the relationship between SES and childhood injury. Quality research into this health issue should be conducted by using a universal method of data collection so that results may be generalised. With this research strategy in place then there would be a better understanding of the aetiology of injury and the effects of interventions would be increased.

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APPENDIX A

Studies of Childhood Injuries Associated with SES

Authors/Purpose	Country of Origin	Sample	Design	SES Indicators	Results
(Brownell et al., 2002) To explore injury rates for Manitoba children. Examined patterns of injury. Looking at the relationship between premature mortality rates and injury rates and SES.	Canada	All children aged 0 to 19 years who died or were hospitalised due to an injury from 1994 to 1997.	Cross sectional design.	Income quintiles.	Rural-urban differences in injury were pronounced with northern Manitoba's rates very high compared to the rest of the province. Both injury mortality and hospitalisation rates correlated significantly with income, higher injury rates associated with lower income levels.
(Pickett et al., 2002) To examine the role of multiple risk behaviours and other social factors in the aetiology of medically attended youth injury.	Canada	All children aged 11 to 15 years who completed the 1997-1998 WHO-HBSC who reported at least one medically attended injury. N=11,329	Cluster sample design.	A 4-point measure of family affluence. A 5-point indicator that described "how well off" respondents perceived their family to be. Parental occupation.	Socio-economic status was not identified as a risk factor for injury. Most salient predictors of non-fatal injury may be the child's risk taking behaviours.

Authors/Purpose	Country of Origin	Sample	Design	SES Indicators	Results
(Hippisley-Cox et al., 2002) To determine the relation between morbidity from injury and deprivation for different levels of injury severity and for different injury mechanisms for children.	UK	All children in the Trent region with injury related admission to hospital from 1992-7. N=56,629	Cross sectional survey.	Townsend scores for deprivation. (Unemployment rate, overcrowded accommodations, rented accommodations, car ownership).	Both total number of admissions for injury and admissions for injuries of higher severity increased with increasing socio-economic depression. The gradients were more marked in the 0-4 year old child than the 5-14 year olds.
(Ni et al., 2002) To describe patterns of recreational injuries among school aged children in relation to SES.	USA	Combined data from the 1997-8 National Health Interview Surveys regarding non-fatal injury episodes that received medical attention from a healthcare professional contacted in person or by phone. N=777	Interview survey.	Family income. Parental education level.	Increased risk of recreational injury associated with a higher family income status or being non-Hispanic white. For children from not poor families, most occurred in sport facilities, children from poor or nearly poor most occurred outside the home.
(Ness et al., 2002) To examine the socio-economic context of injuries and to identify if there was a relationship between the frequency of injuries and the deprivation status of the child.	UK	All children aged 14 years and under who presented to Glasgow Royal Infirmary A&E department with an injury or ingestion over a 3 month period in 1999. N=790	CHIRPP questionnaire.	Carstairs DEPCAT score (male unemployment, no car, overcrowding and low social class).	Childhood injuries are strongly associated with poverty in Glasgow..

Authors/Purpose	Country of Origin	Sample	Design	SES Indicators	Results
(Moustaki et al., 2001) To investigate whether SES of town of residence is associated with risk of childhood pedestrian injury.	Greece	All pedestrian victims, aged 0-14 years who lived in Greater Athens and presented to the Emergency Department of a major Children's hospital during 1996-8. N=1757	Surveillance system database.	Education. Overcrowding.	Almost double the amount of childhood injuries occurred among children residing in less wealthy towns within Greater Athens compared with the wealthier ones.
(Pomerantz et al., 2001) To examine the relationship between injury rates and SES for children.	USA	All children in Hamilton County, Ohio less than 15 years who were hospitalised or died of injuries between January 1, 1993 and December 31, 1995. N=2437	Population-based trauma registry.	Education. Poverty level. Employment. Female headed households.	Higher relative risks were associated with lower income, lower education, more people living below the poverty level, higher percentage of unemployment, higher percentage of non-Caucasians, and higher percentage of households headed by females.
(Faelker et al., 2000) To determine whether risks for childhood injuries vary according to socio-economic gradients.	Canada	All children aged 0 to 19 years in a population served by 2 general hospitals in Kingston, Ontario during the 1996 calendar year. N=4909.	Population-based, retrospective study. Ecological study.	Percentage of individuals living below the poverty line (described using census data).	Consistent relationship between poverty and injury evident. Children living in the greatest poverty levels experienced non-fatal injury rates 1.67 higher than those in the lowest levels.

Authors/Purpose	Country of Origin	Sample	Design	SES Indicators	Results
(Lyons et al., 2000) To test the hypothesis that fractures are similar among children from affluent and deprived areas.	UK	New fractures among children in the Swansea and Neath Port Talbot of South Wales in 1996. The area was divided into quarters of electoral wards on the basis of Townsend scores. N=2399.	Population-based study. Ecological study.	Townsend deprivation index	Fracture rates for all activities were similar across the quarters; affluent areas had higher rates of sports related fractures and the poorer areas more assault related fractures.
(Laing et al., 1999) To estimate the rate of childhood injury resulting in attendance at Accident and Emergency departments, to describe the types of accidents and injuries seen and to relate these to the socio-economic indices for the ward of residence.	UK	Children (0 to 14 years) who were resident in the area and attended the A and E department for treatment of an injury. Data was collected every 5th day between June 1992 and May 1993. N=1147.	Population-based study. Ecological study.	Townsend deprivation index.	Risk of injury was strongly related to social disadvantage.

Authors/Purpose	Country of Origin	Sample	Design	SES Indicators	Results
(Reading et al., 1999) To measure the contribution of individual family factors and area characteristics in determining risk of accidental injury among preschool children.	UK	Preschool accident and emergency attendances Aug 1993 to July 1995 in and around Norwich. N=3851.	Population-based study. Ecological study.	Townsend deprivation index. Mother's age. Lone parenthood. Number of elder siblings.	Preschool accidental injuries are influenced by factors at the individual level and between areas. Injury rates were higher in deprived urban neighbourhoods than affluent areas., however much of the variation in rates was accounted for at the individual level, i.e., young maternal age, no. of siblings, and living in a deprived neighbourhood. Severe injuries were significantly associated with single parenthood.
(Scholer et al., 1999) To identify sociodemographic predictors of infant injury mortality rates for high- and low-risk US infants from 1985 to 1991.	USA	The National Centre for Health Statistics linked US infants (<1 year) born from 1985 to 1991 with death certificates. N=5963.	Historical cohort.	Maternal age. Maternal education. Number of other children. Marital status. Residence (large urban or other).	Predictors of injury mortality included maternal age, education, number of other children and marital status. Based on these factors, 1 in 5 infants in the U.S. can be identified at birth as having a >10 fold increase risk of infant injury mortality, compared with infants in the lowest risk group.

Authors/Purpose	Country of Origin	Sample	Design	SES Indicators	Results
(Durkin et al., 1998) To describe the incidence and causes of paediatric head, spinal cord, and peripheral nerve injuries in an urban setting and to assess the implications of these data for injury prevention programs.	USA	Paediatric deaths and hospital admissions secondary to neurological trauma included in the North Manhattan injury surveillance system from 1983 to 1992 were linked to census counts to compute incidence rate. In Dec. 1988 children in the lower income group were prospectively enrolled in a non-specific general injury program. N=1479.	Historical cohort. Experimental (intervention-non intervention cohort study). Ecological study.	Median family income for each zip code was obtained from the 1990 census.	Residence in a low-income neighbourhood was associated with an increased risk of injury. Within the intervention cohort, targeted children showed twice the decreases observed in the nontargeted children, suggesting a potential positive effect for intervention.
(Kendrick et al., 1997) To examine the relationship between risk factors for childhood unintentional injury and injury outcome and to assess the feasibility of using risk factors to identify children at high risk of injury.	UK	Children registered with a general practice and follow up 1 year later for an occurrence of a medically attended injury. N=540.	Population-based study.	Townsend deprivation index. Maternal age. Single parent family.	Young maternal age and previous injury were associated with a higher number of injuries. The number of children needing an injury prevention intervention was not significantly different from that of the whole population.

Authors/Purpose	Country of Origin	Sample	Design	SES Indicators	Results
(Roberts, 1997) To examine death rates and social class mortality differentials for child injury and poisonings.	UK	All child (0 to 15 years) injury deaths for the period 1985-92 in England and Wales. N=4825.	Population-based study.	Parent's occupational class.	Children in social class V are 4.6 times more likely to suffer accidental death than their peers in social class I. Mortality differentials are steepest for fire-related deaths and pedestrian injury deaths. The gradient was least steep for motor vehicle occurring injuries and suicide.
(Siegel et al., 1996) To investigate the association between maternal age and other risk factors with infant injury deaths in Colorado.	USA	Comparison of unintentional and intentional infant injury mortality by maternal age group (1986-1992). The 2 case group comprised of all unintentional and intentional injury deaths in the first year of life. The control group was a random sample of both survivors and non-injury deaths selected from the entire birth cohort. N=84 (deaths).	Retrospective cohort design and nested case-control study.	Maternal age. Maternal education. Marital status. Number of live births.	Maternal age (20-24 year olds) and marital status significantly affect the rate of unintentional infant injury mortality. Teenaged motherhood was a risk for intentional injuries.

Authors/Purpose	Country of Origin	Sample	Design	SES Indicators	Results
(Addor et al., 1995) To determine the incidence of injuries among preschoolers and their risk factors.	Switzerland	A systematic sampling technique was used where 29515 families with at least one child born between Jan 1986 and Dec 1991 were sorted by place of residence in the Canton of Vaud, Switzerland and every sixth family selected down the list. N=4540.	Population survey by questionnaire.	Type of residence. Ratio of rooms and number of children in the household. Mother's education. Mother's occupation. Percentage occupation of mother. Partner's occupation. Household composition. Mother's age at time of injury.	Socio-economic factors did not influence the occurrence of injuries.
(Kogan et al., 1995) To examine cumulative risk of injury among children from birth to 3 years old and to provide national-level cause-specific estimated medically attended non-fatal injuries.	USA	Data from the 1991 Longitudinal Follow-up to the National Maternal and Infant Health Survey. N=1730.	Retrospective survey of a birth cohort.	Maternal education. Marital status. Household income.	Risk of reported injury was higher for children whose mother had a high school education, children from married households and whose incomes were >$20,000.

Authors/Purpose	Country of Origin	Sample	Design	SES Indicators	Results
(Stevenson et al., 1995) Identification of specific hazards that contribute to injuries that enable the development of preventative strategies.	Australia	Case subjects were children aged 1 to 14 years who sustained an injury in a collision with a motor vehicle while running, walking or crawling on a road, verge or footpath in metropolitan Perth during a 2-year period. Two control subjects were individually matched to each case for age and sex. N=97(injured), N=200(control).	Case-control study. Ecological study.	Osborn and Morris SES index (parental occupation, parental education, domestic overcrowding, tenure of accommodation and neighbourhood ranking.	The proportion of vehicles exceeding the speed limit was greater in low SES areas and influenced the likelihood of childhood pedestrian injury.
(Durkin et al., 1994) To investigate the relationship between socio-economic disadvantage and the incidence of severe childhood injury.	USA	Small area analysis was used to examine socio-economic risk factors for childhood injury resulting in hospitalisation or death in Northern Manhattan 1983 to 1991. N=4592 (n=162 deaths).	Retrospective study. Ecological study.	Based on 1990 census tract. Income (proportion of households with annual incomes <$10,000) Marital status. Education. Crowding. Parent's employment status.	Low income and single parenting were important predictors of all injuries. Smaller significant associations included non-high school graduate parents and parental unemployment.

Authors/Purpose	Country of Origin	Sample	Design	SES Indicators	Results
(Carter et al., 1993) To identify the nature and extent of accidents among children under 5 years old at one general practice over a 12-month period and to compare the social characteristics of children from a control group, matched for age and sex.	UK	Children registered with one general practice that presented with an injury at the practice or the A and E department from Jan 1991 to Dec 1991 in North Staffordshire. The control group were children matched from the same practice. N=100.	Prospective cohort study. Ecological study.	Jarman's deprivation score based on social class distribution in England and Wales according to 1981 census.	Children who had accidents had younger mothers and were more likely to have a sibling who had an accident the previous year.
(Gofin et al., 1993) A study of injuries among 0 to 15 year old children attending primary care clinics located in 2 cities in the coastal plain of Israel.	Israel	The study population covered children 0 to 15 years old registered in the practices of two physicians in the lower social class neighbourhood and one physician in the middle class neighbourhood one week each month from Sept 1987 to Aug 1988. N=2765. N=1582.	Cohort study.	Maternal education. Maternal age. Maternal occupation. Social class according to the adaptation of the British Registrar General's occupation grade. Number of children.	The incidence of injuries was 1.7 times higher in the clinic in the lower social class neighbourhood than that in the clinic in the middle class neighbourhood. The majority of the injuries took place in the home and while playing in a playground.

Authors/Purpose	Country of Origin	Sample	Design	SES Indicator	Results
(Jolly et al., 1993) To investigate whether SES was related to child injury rate in Australia and assess whether or not the relationship between injury and SES might be different for different categories of injury.	Australia	All children from birth until 14 years who sustained an injury between Jan 1989 and June 1990 who lived in the catchments area of 4 different hospitals in Brisbane and Melbourne and were recorded on the National Injury Surveillance Unit collecting system and linked to census data from each postal code. N=38,000.	Retrospective study. Ecological study.	Employment, education, and single parenthood were taken from the 1986 census.	There was a consistent pattern of moderately strong statistically significant associations found between measures of disadvantage and injury rate at the postal code level of aggregate.
(Carey et al., 1992) To investigate variations in the incidence and patterns of child injury mortality in New South Wales by geographical area and SES.	Australia	Deaths in children aged 0 to 14 years due to unintentional injury from 1985 to 1987 using ICD-9 External Codes in New South Wales. N=465.	Retrospective study. Ecological study.	Geographical based indicator of SES using income, education, occupation, wealth and power/prestige categories.	Child injury mortality rate was significantly higher in the rural area than the metropolitan area. A negative linear association between SES and child injury mortality was found in the Sydney metropolitan area, especially for child pedestrians.

Authors/Purpose	Country of Origin	Sample	Design	SES Indicators	Results
(Dougherty et al., 1990) To examine motor vehicle traffic accident deaths to pedestrians and bicyclists, 0 to 14 years, by income quintile of area of residence.	Canada	Based on deaths in urban Canada in 1981, deaths in Montreal 1979-1983 and injuries resulting in hospital care or police reports in Montreal in 1981. N=92. N=69. N=1133.	Retrospective.	Census tracts were ranked by median household income.	Rate of pedestrian injury in Montreal to children living in the poorest neighbourhoods was 4 times that of children living in the least poor neighbourhoods. Rate ratio comparing the poorest quintile to all other quintiles was 2.0 for deaths in urban Canada.
(Bourguet et al., 1989) To identify risk factors for injuries among preschool patients of a university-affiliated community-based family practice centre.	USA	All injured children under 6 years between May 1986 and April 1987 that presented at the Family Practice Centers of Aultman hospital in Canton, Ohio. Control subjects chosen at the same time of injury were children of same sex and age. N=34, N=36.	Case-control study.	Annual family income. Parent's education. Employment status. Occupation and industry.	Children with mothers who were high school graduates had the lowest risk of injury. Children whose mothers had attended college were at greatly in creased risk.
(Joly et al., 1989) To study the link between cycling accidents and traffic conditions among urban children.	Canada	All bicycling accidents requiring hospital visits among children 15 years or less occurring on the Island of Montreal, Oct 1980 to Mar 1982. N=209.	Cross sectional prospective survey. Ecological study.	Characteristics of the census tract where the child lives (level of education, income and housing).	High-risk areas were characterized by high population density, fast and dense vehicular traffic and the absence of parks. The SES of the injured child tended to be low.

Authors/Purpose	Country of Origin	Sample	Design	SES Indicators	Results
(Larson et al., 1988) To identify factors associated with injuries in the first 3 years of life and to assess their predictive utility.	Canada	Any child born in 1983 whose mother resided within a designated Montreal community health district. N=918.	Cross-sectional cohort study.	Mother's education. Family income. Marital status. Mother's age.	Significantly elevated risks of injury for children of single, unemployed mothers. Increased risk of injuries among children of lower income or poorly educated mothers was not found.
(Pless et al., 1987) To describe the incidence of medically attended MVA's in children and to contrast the characteristics of the mild and severely injured.	Canada	All children living in Montreal in 1981 as estimated from that years' census. N=1004.	Monitoring system. Ecological study.	Postal codes and census tract were classified by SES, based on a child-poverty index.	Pedestrian and bicycle (but not passenger) injuries in low-income areas were 4 to 9 times greater than those in more affluent areas.
(Rivara et al., 1985) To examine the factors in the child's living environment and socio-economic background that contributes to the risk of pedestrian injury.	USA	All pedestrian injuries to children aged 0 to 14 years, occurring in Memphis in 1982 and reported to the police. N=210.	Retrospective study.	Household income. Families below poverty level. Median housing and rental value. Female headed household. Crowding. Census tract in which each injury occurred.	The socio-economic background of the child and the characteristics of the neighbourhood make significant contributions to the risk of pedestrian injury.

Authors/Purpose	Country of origin	Sample	Design	SES Indicators	Results
(McDermott et al., 1984) To investigate the problem of domestic non-fatal accidents in Ireland.	UK	Non-fatal domestic accidents in children under 14 years in Jan to Mar 1980 of which 47 were admitted. N=1800.	Prospective computerized analysis.	Registered General's socio-economic groups.	There was a high incidence of accidents in social class 3.
(Taylor et al., 1983) Comparison of certain health outcomes in the early life of a group of children born to teenage mothers and to those born of older mothers.	UK	Singleton children of teenage mothers were compared with singleton children of older mothers in the UK. N=1031. N=10950.	National longitudinal cohort study.	Domestic crowding. Paternal education. Tenure of accommodation. Type of neighbourhood. Paternal occupation. Maternal age.	There was an increased likelihood of accidents in the home and outdoors (excluding traffic accidents) in children born to teenage mothers, maternal age did not influence the rate of accidents occurring in nursery school.

APPENDIX B

Studies of Parental Attitudes and Safety Awareness of Childhood Injuries

Authors/Purpose/Country	Design/Sample	Parental Beliefs and Attitudes	Use of Safety Equipment and Knowledge	SES Measurement	Results
(Hapgood et al., 2001) To investigate the validity of self reported safety behaviours as a proxy for injuries in unintentional injuries research. UK	Community based study. Postal survey of parents who attended 18 general practises in Nottingham. N=764		Safety behaviour was measured by computing a safety practices score from self reported safety practises for each respondent.	Age. Home ownership. Sole parenthood. Employment. Overcrowding.	Self reported safety behaviours do not appear to be good predictors of childhood unintentional injuries.
(Evans et al., 1997) To examine the effect of SES on the parental attitudes of preschool children towards child home safety issues and practice of home safety measures. UK	Community-based study. Postal survey of parents living in two different affluent areas in Scotland. N=134 (more affluent). N=116 (less affluent).	12 variables relating to home safety presented, and parents asked to respond to the one closest to their own opinion.	Parents asked to name any child safety equipment they had purchased or been given for the use in their home. Parents asked what safety advice they had been given and from what source.	Age. Education. Home ownership. Occupation. Sole parenthood.	In general, parents in both groups showed similar attitudes towards home safety. There were significant differences in parental perceptions between the two groups of the safety of the neighbourhood in which they lived and over the availability of money to keep their child safe.

Authors/Purpose/Country	Design/sample	Parental Beliefs and Attitudes	Use of Safety Equipment and Knowledge	SES Measurement	Results
(Ueland et al., 1996) To identify predictors of the adoption of safety measures by mothers of 2 year old children. Norway	Postal survey to all mothers of 2 year olds in 30 municipalities in western Norway. N=1233.		Adoption of 14 specific safety passive measures. Specific use of 4 types of safety equipment: car restraints, bicycle helmets, and life jacket in small boats, wearing reflectors in the dark.	Age. Education. Family income. Number of children in the household.	High income, and older, married mothers were positively associated with the use of safety measures.
(Root, 1996) To examine parental knowledge and attitudes towards preventing injuries to their children. Canada	Self completed questionnaire and 14 discussion groups with "mainstream" Canadians, Aboriginals and East Indian and Chinese descent. N=101.	The questionnaire asked questions about awareness of childhood injury, attitudes and beliefs that contribute to injury and beliefs about preventability. The discussion group sessions presented risky scenarios with a discussion after.	The questionnaire asked parents about the use of safety equipment.	Education. Household income. Occupation. Age. Family composition.	Low SES parents were generally unaware that injuries are the main cause of death among children. Nearly ¼ showed an optimism bias. Injuries were seen as mostly uncontrollable. Parents were aware of the types of injuries but not the sources of the injuries. Parents stated that children learn to recognise a risky situation based on adult teaching and experience. There was a general lack of awareness of the risk of injury. Degree of injury risk was based on the child's characteristics.

Authors/Purpose/Country	Design/Sample	Parental Beliefs and Attitudes	Use of Safety Equipment and knowledge	SES Measurement	Results
(Sellstrom et al., 1996) To test the hypothesis that subjective norms are the most important determinants of mothers' injury-preventative behaviour. Sweden	Three questionnaires were sent to 400 parents of 3, 4, and 9 year old children respectively. N= 293. N=267. N=310.	Parents asked about the perceived likelihood of injury, and perceived seriousness of injury. Causal attribution of injury. Perceived benefit of and barriers for preventative behaviour. Subject perceived norm measured by the opinion of others.		Age. Marital status. Education. Employment status. Profession. Number of children in the family.	No association between SES and injury preventative measures were found in the first questionnaire, in the second one older mothers, and those with more than one child were significantly more inclined to take preventative action. In the last questionnaire higher education and white-collar professions were significantly more likely to take preventions.
(Gielsen et al., 1995) To determine parents' injury prevention practices among families living in disadvantaged, urban areas. USA	In depth interviews from mothers who brought their children (aged 6-36 months) to a hospital based paediatric primary care clinic. N=150		Mothers were asked about their use of 8 specific prevention practises in the home.	Income.	Factors significantly associated with the number of injury prevention practises implemented were family income, housing quality, and environmental barriers.

Authors/Purpose/Country	Design/Sample	Parental Beliefs and Attitudes	Use of Safety Equipment and Knowledge	SES Measurement	Results
(Kendrick, 1994) To examine possession and perceptions of the importance of safety equipment. UK	A questionnaire given to parents by the health visitor at the eight-month hearing test in 5 areas of Nottingham. N=203	Parents were asked about their perceptions of home safety.	Parents were asked about their possession of home safety equipment.	Maternal age. Number of children. Housing tenure. Receipt of benefits. Family type.	There was no significant difference in perceived importance of safety equipment. Families in receipt of benefits, non-owner occupiers, single-parent families and those with only one child possessed significantly fewer items of safety equipment.
(Sparks et al., 1994) To aid the development of appropriate policies to achieve the "Health of the nation" strategic target for reducing the death rate from accidents amongst children under 15 years. UK	In-depth interviews from a sample of parents from a high (working-class, relatively deprived urban area) and from a low (middle-class, relatively affluent, semi-rural area) childhood accident rate area. N=14, N=18.	Parents were asked about their views and perceptions on safety of the area they lived in and safety of the home. They were asked about the likelihood of a minor accident in the next month, their risks of and worries about serious injury and the difficulty in keeping children safe.	The parents were asked about their teaching on safety, the use of safety devices in the home, and the development and enforcement of safety rules.	Occupation. Family type. Number and ages of the children. House type. Length of residence. Employment.	The parents in the deprived area saw their area as an unsafe place to live in, and the majority thought their homes were unsafe and lacking adequate safety measures. The relatively affluent area felt basically safe in their daily lives but had concerns about traffic and their children's' journey to and from school, most families thought that their homes had the necessary features to keep their children safe. All the parents in the study developed rules, routines and practices to keep their children safe.

Authors/Purpose/Country	Design/Sample	Parental Beliefs and Attitudes	Use of Safety Equipment and Knowledge	SES Measurement	Results
(Colley, 1994) To assess parents' of 18month old children awareness of accidents and safety in the home to use as a basis for providing appropriate health visitor input into this area of work. UK	Structured questionnaire from a sample from all areas and town of Chippenham and surrounding villages. N=26.	Parental knowledge was assessed in 3 areas; accidents statistics, child development and hazards relating to accidents, and first aid.	Use of safety equipment: cupboard locks, smoke detector, fixed fireguard, kettle guard, socket covers, stair gate, window locks, safety harness, medicines in locked cupboard.	Parent's occupation used to classify social class.	There was very little difference in the attitudes among the different social classes. A greater proportion of the higher SES groups agreed that parents do not supervise their children adequately and that parents do not know enough about safety. A greater proportion of lower SES groups agreed that accidents are due to some families living in unsafe housing. There was a greater use of safety equipment by those in higher social class except for the storage of medicines and cleaning fluids.

Authors/Purpose/Country	Design/Sample	Parental Beliefs and Attitudes	Use of Safety Equipment and Knowledge	SES Measurement	Results
(Alberta Safe Kids Campaign, 1994) To gather information on the awareness and perceptions of injuries to children, to determine the attitudes and beliefs about risks to their children's health, to determine current and preferred sources of safety information and content recall, to poll respondents to attitudes about bicycle helmet legislation. Canada	Telephone interviews of a random sample of parents of children under 15 years across Alberta. N=276.	Parents were read a series of statements about children and accidents and asked to agree or disagree with them. Parents were asked to cite as many worrisome health risks to their children as they could.	Parents were asked how often their family physician or paediatrician had discussed safety with them.	Age. Education level. Household income. Ethnic background.	Younger parents or those with lower educational levels were more apt to suggest that the injury their child sustained could not have been prevented. The more educated respondents said they prefer to find safety information through the media. The more educated the respondent the less likely they are to support helmet legislation.
(Wortel et al., 1993) To assess mothers' safety measures related to poisoning, burns and falls, the consistency between these measures within one type of accident, and the relationship to the mothers' education. Netherlands	A written questionnaire by mothers of pre-school children. N=1129		Safety measures adopted by the mothers.	Mother's education.	There was no substantial evidence of a relationship between the mothers' safety measures and their education.

Authors/Purpose/Country	Design/Sample	Parental Beliefs and Attitudes	Use of Safety Equipment and Knowledge	SES Measurement	Results
(Glik et al., 1991) To assess the relationship between parents' perceived risk of childhood injuries and familial, sociocultural and situational variables. USA	Random digit dial telephone survey of households with a preschool child in the Columbia, South Carolina, metropolitan area. N=1247.	Parents were asked about perceived risk of injury and perceptions of risk of hazard.	Safety behaviours adopted using the TIPP scale instrument.	Mother's age. Family income. Education. Race. Number of children in the household.	Persons who were black and had lower incomes reported higher perceived risks for injury for their children.
(Eichelberger et al., 1990) To assess parental attitudes and knowledge of childhood injury, identify subgroups of parents who could benefit from targeting of specific safety interventions, and identify ways to make child safety more salient to parents. USA	Nationwide random digit dialling telephone survey of parents with at least one child younger than 14 years. N=404.	Parents were asked about things that they worried might happen to their children. Parents were asked to name the two most frequent causes of accidental death. Parents were asked what specific typed of safety information they would most like to receive.	Parents were asked what countermeasures they had taken in the last year to reduce the likelihood of their child being involved in an accident.	Education. Family income. Occupation of the head of the household. Ethnic background. Age.	Parents of lower SES, blacks and parents younger than 30 years believed the risk of kidnapping exceeded that of death from a car crash. Most parents think that serious injuries are preventable. A higher percentage of parents from the higher SES were able to name preventative measures they had taken than parents in the lower SES. Lower SES, parents younger than 30 years and those with more than 3 children expressed a higher interest in child safety information.

Authors/Purpose/Country	Design/Sample	Parental Beliefs and Attitudes	Use of Safety Equipment and Knowledge	SES Measurement	Results
(Rivara et al., 1989) To provide current information on parental attitudes and practices on childhood pedestrian injuries that could be used to guide preventative programs. USA	Self-administered questionnaire was sent home to parents of children in kindergarten through to grade 4 in 21 elementary schools of the Highline Public School District. N=2464.	Parents were asked about street crossing practices and skills, neighbourhood safety, and how large parents perceived the risk of pedestrian injury to be.	Parents were asked about their use of pedestrian skills taught to their children.	Household income. Unemployment. Education.	The perceived risk of pedestrian injury varied with parental education.

Chapter 3 – Paper II

Poverty and Childhood Injury:

Socio-Economic Status and Childhood Injuries in Alberta: A Secondary Analysis of Administrative Data

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CHAPTER 3

Poverty and Childhood Injury:

Socio-Economic Status and Childhood Injuries in Alberta: A Secondary Analysis of Administrative Data

Introduction

Childhood injury is recognised globally as a major health concern throughout developed countries. It is the leading cause of mortality, morbidity and permanent disability in children. Unfortunately, Canadian children and youth are among those at risk, ranking seventh out of eight industrialised countries (Health Canada, 1997). It is apparent that some children are more at risk for injury than others, especially those from lower socio-economic families. The causes for this additional vulnerability are more than just behavioural; environmental and social conditions must also be examined.

Many studies have looked at the relationship between socio-economic status (SES) and injury mortality rather than morbidity (e.g. Scholer et al., 1999; Roberts, 1997). However, mortality from injuries is just the tip of the injury pyramid with the numbers increasing downwards. Major trauma with prolonged hospitalisation and rehabilitation can lead to lifetime disabilities, hospitalisation for injuries, use of the emergency room, and primary care services, and lastly those injuries treated at home and in schools make up the other layers of the pyramid (KIDS SAFE Connection, 1999). "In 1995, 1,397 Canadian children and youth (0-19 years of age) died as a result of injuries, and 47,228 were hospitalised." (Health Canada, 1999, p.248).

The relationship between SES and childhood injury is evident when environmental and social issues are examined. "Underprivileged" children tend to live in higher

population density neighbourhoods with more traffic and fewer playgrounds. Apart from the likelihood of travelling more by foot or bike, family vehicles may differ from higher SES families who often own newer, heavier vehicles with airbags and correctly installed child restraints. Similarly, poorer housing conditions may lend themselves to more injuries. Furniture, appliances and heating equipment may be older and less reliable with fire detection apparatus less likely to be installed (UNICEF, 2001). These risks are intensified by the presence of social conditions associated with poverty: single parenthood, teenage parents, lower levels of parental education, large family size, and lack of affordable day-care. These factors may add to the stresses of parenting and reduce the knowledge and experience needed to provide a safe environment for the child. In addition, these social conditions can contribute to parental drug and alcohol abuse, again increasing the risk of childhood injury. Therefore, it is not surprising that children from lower SES families are more at risk for unintentional childhood injury.

Socio-economic status is a vague term that is often expressed using an ordinal scale (e.g., income, occupation or educational level obtained). There is no standard measure of SES, and the process of choosing the most appropriate SES indicator is difficult. Consequently, the variables used to define SES vary from study to study. Unfortunately, few countries have adequate data relating childhood injury to SES (UNICEF, 2001). To date, there have been no Alberta studies published examining the relationship of SES and childhood injury. However, Alberta Health and Wellness maintains the provincial health administrative database that tracks all children's visits to a physician; this database also itemises the payment status of the Alberta provincial health insurance plan which can be used as a proxy for individual level SES indicator.

By examining this database insight into the relationship between poverty and childhood injury can be obtained.

Purpose

The purpose of this paper is to examine relationships between childhood injury and socio-economic status (SES) in Alberta. The study addressed four research questions: (1) What is the relationship between childhood injuries and the child's socio-economic status in Alberta? (2) Are children of lower socio-economic status more likely to present for a physician consultation with an injury than those of higher socio-economic status in Alberta? (3) Are there differences in the number of childhood injuries of those living in rural and urban Alberta? (4) Are there differences in the number of childhood injuries of those living in the two major cities in Alberta, Edmonton and Calgary?

Method

Secondary analysis was performed using data from Alberta Health and Wellness (AHW) on all children who presented for a physician's consultation with an injury during one fiscal year. A retrospective, cross sectional study identified any differences in age, gender and SES between children who sought treatment for an injury from those who were registered with AHW and sought treatment for another reason during the fiscal year, as determined from the diagnoses recorded in the Provincial health administrative database.

Participants

The study population consisted of all children, age 0 to 17 years, registered with the Alberta Health Care Insurance Plan (AHCIP), who were seen by a physician for an

injury during the 1995-96 fiscal year either in a physicians office, outpatient department, emergency and/or as an inpatient in a hospital.

Procedure

Two data sets were received from Alberta Health and Wellness; service data and registration data. The service data contained the following elements: service start date (April 1st 1995 through March 31st 1996, inclusive), primary diagnosis, service location, and a unique identifier. The registration data contained information about the gender of the child, integer age at March 31st 1996, postal code, Regional Health Authority, healthcare premium, and a unique identifier. These two data sets were merged using the unique identifier as the common denominator.

Measures

Demographics. Demographic data included: age and gender of the child, postal code and healthcare premium. To determine the child's place of residence, postal codes were examined. Using Canada Post's guidelines, if the postal code had a 0 as the second character then it was a rural address (classified as roughly 4000 points of call/delivery), if there was a 5 or 6 as the second character the address was in Edmonton, and if there was a 2 or 3 the address was in Calgary; these are the two largest cities in the province, each with a population over 800,000. The individual level SES indicator was the payment status of the Alberta provincial health insurance plan. This indicated which payments were subsidised by the provincial or federal (in the case of Treaty citizens, i.e. people registered under the Indian Act) governments and those paid in full by the remaining residents. Families who received a subsidy (where the premium was partly or totally paid), were supported by social services (families on welfare), or were of Treaty

status, were grouped together as receiving a subsidy, and those that had received no financial assistance with healthcare premiums were classified as receiving no subsidy. The qualifying levels for the premium subsidy in the benefit period July 1st 1995 until June 30th 1996 were based on the 1994 adjusted taxable balance; a family with a taxable income of $7,500 or less received a full subsidy, a partial subsidy was granted if the income was between $7,501 and $12,620 (Alberta Health and Wellness).

Injury. The injury episode was classified using the World Health Organization (WHO) International Classification of Diseases (ICD), 9th. Revision, codes 800 to 999 (Appendix A). These injuries were then collapsed into 13 revised codes to elicit patterns of injury (Appendix B). The revised codes were used to present a clearer picture of injuries by grouping together some of the less used codes; for example, unusual classifications, such as, certain traumatic complications and unspecified injuries were classified under 'others' (ICD-9 codes 905-909 and 958-999) The service location indicated where a physician had examined the child; emergency or clinics, diagnostic services, physicians office, or as an inpatient.

Analysis Plan

In analysing the results of the data, both proportions (relative frequencies of the occurrence) and rates per 1000 children were used. Rates of injury were calculated by using Microsoft EXCEL. The use of the two types of analyses allowed for (1) the proportion of the values falling within the class interval, this was multiplied by 100 to obtain a percentage, for example, the percentage of a type of injury compared with the overall number of injuries, and (2) the rate which examined the frequency of the occurrence of an event by dividing the number of observed cases by the number of

possible cases and then the percentage multiplied by 1000 to obtain the rate per 1000 children, for example, injury rates per 1000 children registered with Alberta Healthcare.

Results

This section presents quantitative results of the analysis of the data provided by Alberta Health and Wellness. Secondary analysis of the data was performed using the Statistical Package for Social Sciences (SPSS) 10.

Demographic Characteristics

Table 3-1 outlines demographic characteristics of the children who were registered with Alberta Health and Wellness during the 1995-96 fiscal year. A total of 182,758 children were treated for an injury during the year, a 24% subset of 749,924 registered children.

Table 3-1
Demographic Characteristics of Children Aged 0 to 17 Years Registered with Alberta Health and Wellness during the 1995-96 Fiscal Year

	Total Population		Injured Children	
Variable	**N**	**%**	**N**	**%**
Gender of the child				
M	365509	48.7%	102445	56.1%
F	384415	51.3%	80313	43.9%
Age of the child				
Less than one year	38478	5.1%	2226	1.2%
1 to 4 years old	163184	21.8%	38886	21.3%
5 to 9 years old	215835	28.8%	43516	23.8%
10 to 14 years old	213959	28.5%	59589	32.6%
Over 14 years old	118468	15.8%	38541	21.1%
Place of residence				
Urban	549300	73.2%	135935	74.4%
Rural	200624	26.8%	46823	25.6%
Residence in a major city				
Edmonton	157378	21%	39093	21.4%
Calgary	183382	24.4%	43689	23.9%
Healthcare premium groups				
No subsidy	578982	77.2%	140661	77%
Subsidy	94549	12.6%	21558	11.8%
Social services	34595	4.6%	9608	5.3%
Treaty status	41798	5.6%	10931	6%

Types of Injury

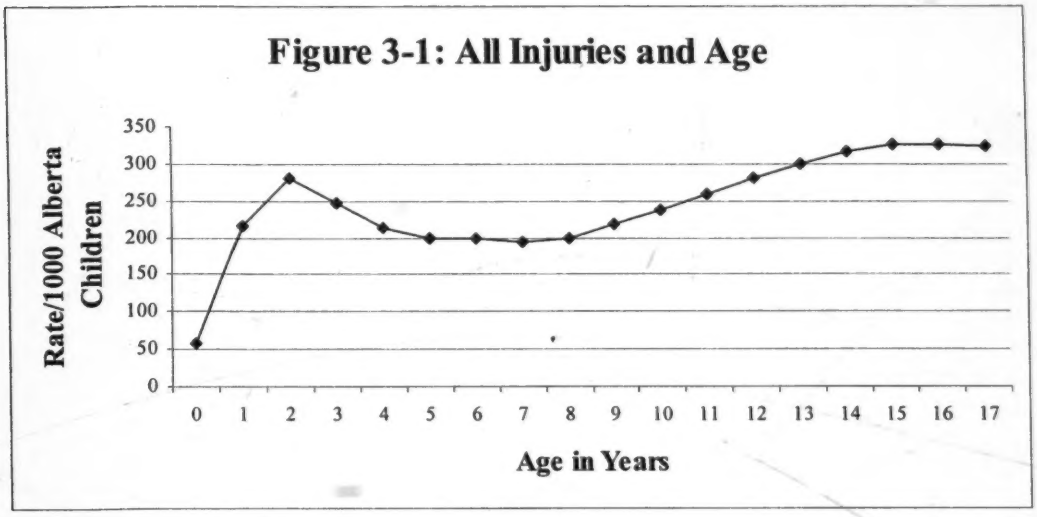
Alberta Health and Wellness coded the types of injury according to ICD 9 codes. This information about the injury was then recoded into 13 groups of injury. Table 3-2 demonstrates a relative frequency of the types of injuries that occurred and the rate per 1000 Alberta children. For the purposes of this research study only the first injury event was counted.

Table 3-2
Types of Injury

Type of Injury	ICD 9 code	Frequency	Percentage of total injuries	Rate/1000 Alberta Children
Dislocations, sprains and strains	830-848	46134	25.2%	61.5
Superficial injury and contusions	910-924	44246	24.2%	59
Open wounds	870-897	36959	20.2%	49.3
Fractures	800-829	16411	9%	21.9
Intracranial injury	850-854	5232	2.9%	7
Burns	940-949	4664	2.6%	6.2
Foreign body	930-939	4608	2.5%	6.1
Poisoning	960-989	3988	2.2%	5.3
Crushing injury	925-929	2468	1.4%	3.3
Internal injury of chest, abdomen and pelvis	860-869	195	0.1%	0.3
Injury to nerves and spinal cord	950-957	151	0.1%	0.2
Injury to blood vessels	900-904	101	0.1%	0.1
Others	905-909 958-959 990-999	17601	9.6%	23.5

Differences between Age and Childhood Injuries

A first analysis was performed to compare rates of injury by age. Figure 3-1 illustrates the injury rate per 1000 children registered with Alberta Health and Wellness. There was a sharp increase in injury after the first year of life to about 280/1000 children at age two, and then the rate dropped slightly before peaking at age 15 years with a rate of over 310/1000.



Differences between Gender and Childhood Injuries

A second analysis was then performed to compare rates of injury by gender. Figure 3-2 shows the injury rate per 1000 registered Albertan children divided into gender. Apart from poisonings, more males than females were injured in all the injury classifications.

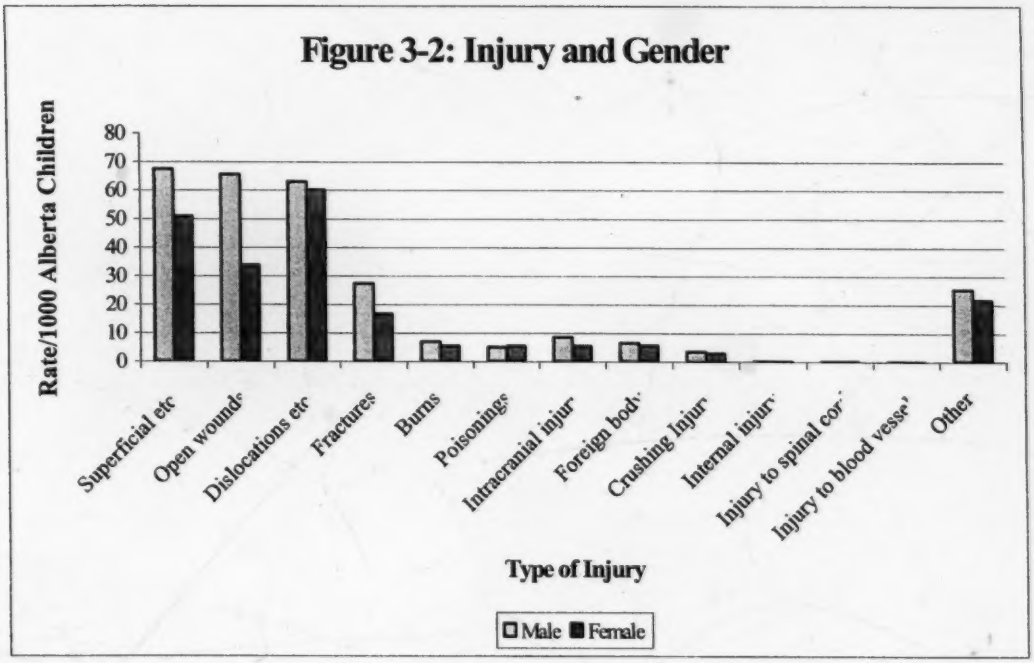
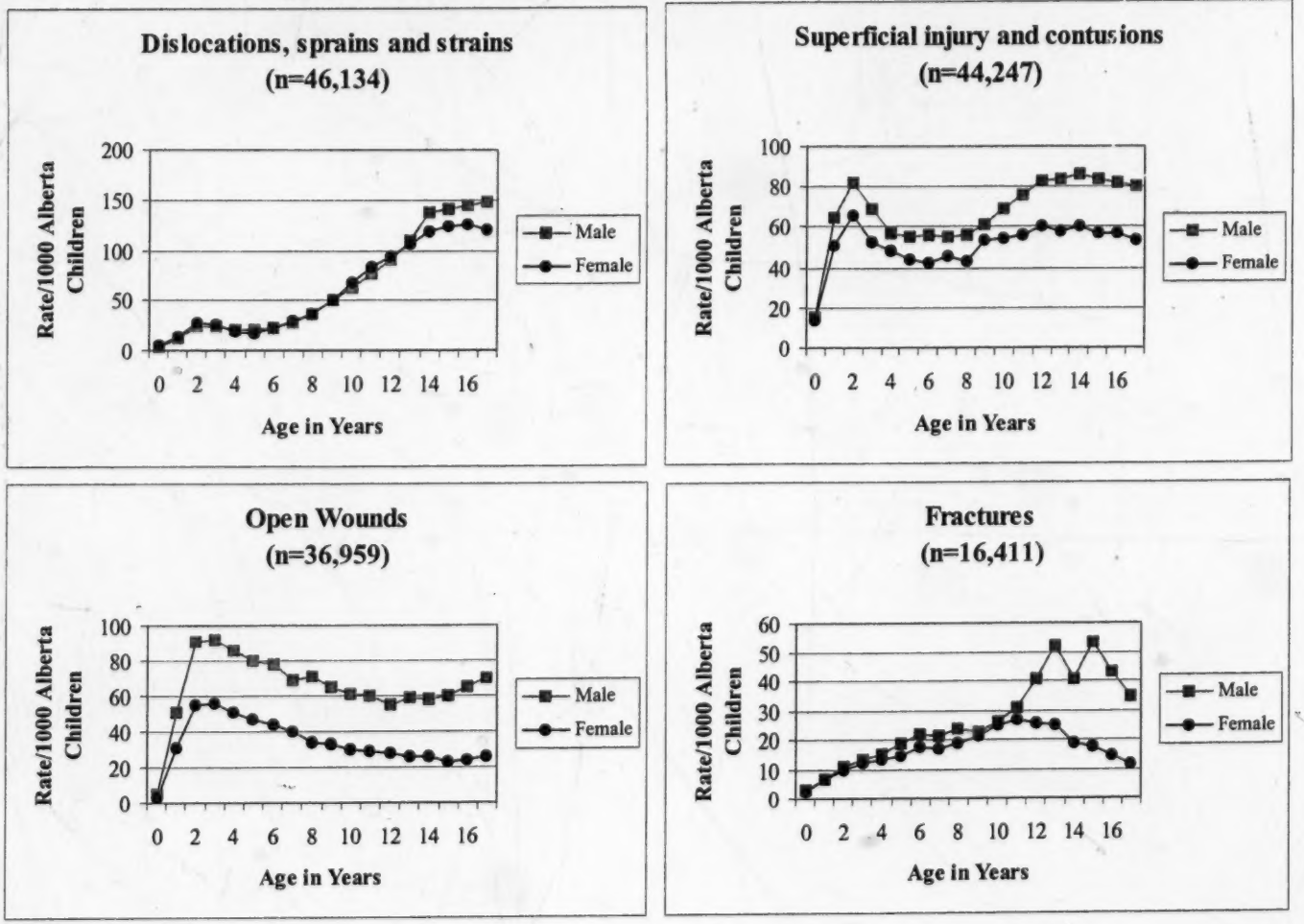


Figure 3-3 illustrates the top four types of injury in relation to gender, stratified by age, which were seen by a physician. Males and females followed a similar trend in rates of injury in the dislocations, sprains and strains injury category until age 14 when rates of males exceeded females. Males had consistently higher rates of superficial injuries and contusions, and open wounds compared with females. There was a dramatic increase in fractures in males from the age of twelve until seventeen (40/1000 to 52/1000 in some age groups), meanwhile fractures in females dropped by about 50%.

Figure 3-3: Rates of Injury in Relation to Gender for the Top Four Types of Injury



Relationship between SES and Childhood Injuries

Figure 3-4 illustrates a further analysis examining the SES and injury rates per 1000 children registered with Alberta Health and Wellness. There was a disproportionate increase of injury rate in the subsidy group in superficial injuries and contusions, open wounds, burns and poisonings. However, dislocations, sprains and strains, and fractures showed a disproportionate increase in children from unsubsidised families.

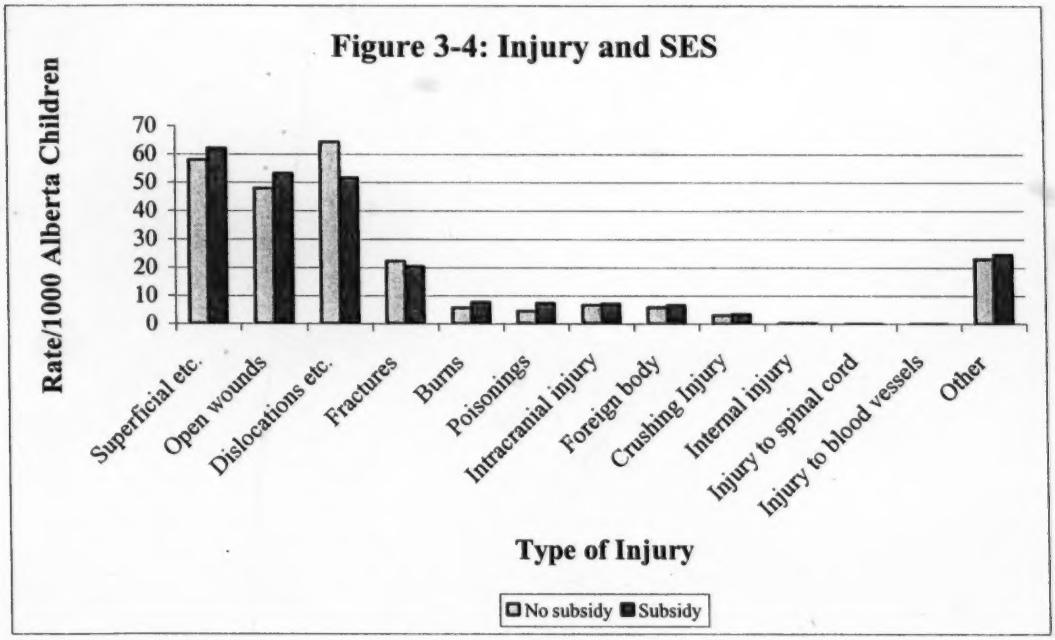
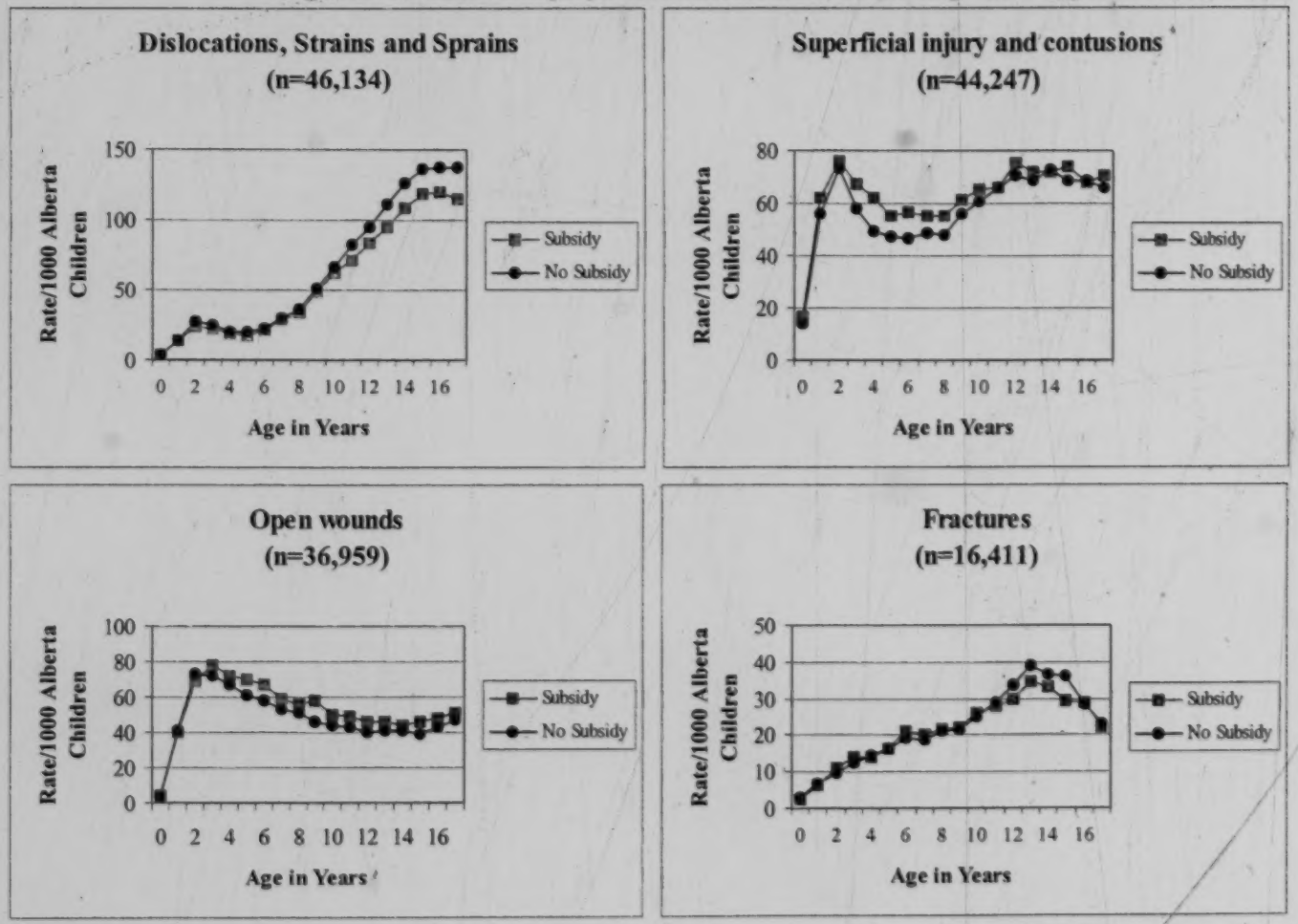


Figure 3-5 shows the top four types of injury in relation to SES stratified by age that presented to a physician for a consultation. Children from families with subsidised healthcare premiums were more likely to seek a physician's consultation for superficial injury and contusions, and open wounds from about age two until seventeen, than those from unsubsidised families. The rate of children with fractures was similar in both groups until age eleven to age fifteen when more children from families with no

healthcare subsidy presented to a physician. A similar pattern was observed with the dislocations, strains and sprains injury classification, where more children, aged eleven to seventeen, of families receiving no subsidies obtained a physicians opinion.

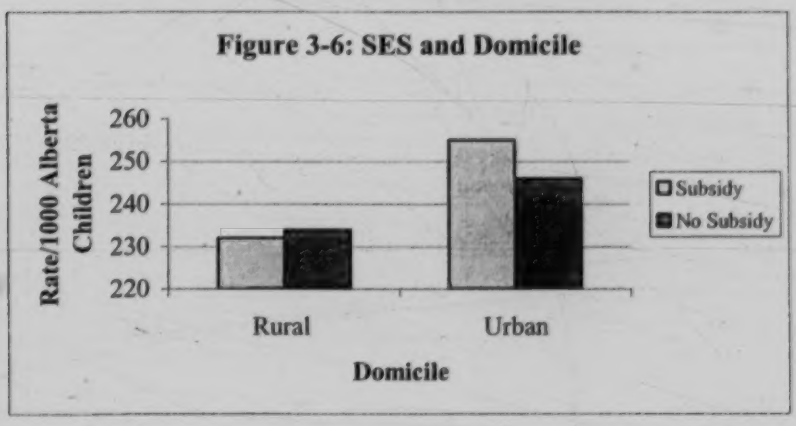
Figure 3-5: Rates of Injury in Relation to SES for the Top Four Types of Injury



Rural versus Urban Differences

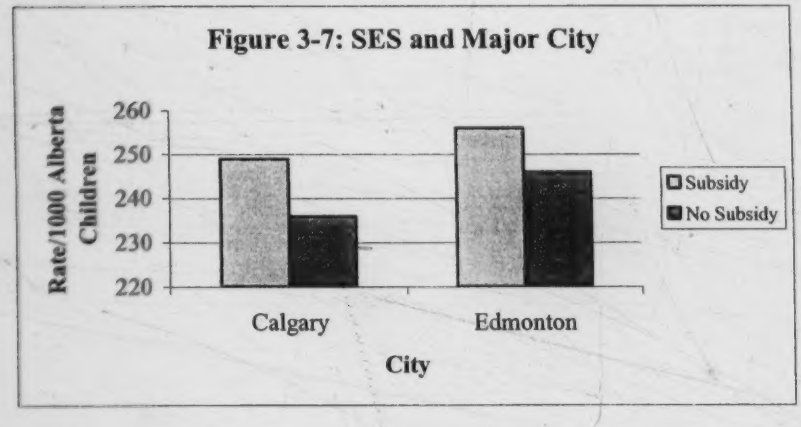
Figure 3-6 illustrates the relationship between childhood injuries and SES among those living in rural and urban domiciles. Children with subsidised healthcare living in urban centres were more likely to present with an injury to a physician than unsubsidised children. Whereas, children with no healthcare subsidies living in rural areas were more likely to present with an injury than those subsidised. Overall, there was a higher rate of childhood injuries in urban centres.

Figure 3-6: SES and Domicile



Edmonton versus Calgary

Figure 3-7 illustrates the relationship between childhood injuries and SES in the two major cities in Alberta, Edmonton and Calgary. Overall, a higher rate of children living in Edmonton saw a physician for an injury, during the 1995-96 fiscal year than Calgary. In both cities the injured child was more likely to be receiving a healthcare subsidy.



Relationship Between SES and Dependent Variables

Table 3-3 illustrates the results of a Pearson's chi-square test performed on the data using low SES (subsidised healthcare premiums) and high SES (unsubsidised healthcare premiums) as an independent variable, and whether the child resided in a rural or urban setting as the dependent variables are also shown in the table. This test shows there was evidence of a relationship ($p<0.001$). Similarly, the same test performed on the data using SES and whether the child lived in Edmonton or Calgary shows evidence of a relationship ($p<0.001$).

Table 3-3
Relationship between SES and Dependent Variables

Dependent Variables	χ^2	***P* value**
Rural versus urban	2322.63	<0.001
Edmonton versus Calgary	791.36	<0.001

Discussion

The findings from this secondary analysis of data from Alberta Health and Wellness illustrate there is a relationship between SES and the types of childhood injury. Children of lower SES are more likely to present for a physician consultation with different types of injuries than children of higher SES in Alberta. Children whose

families had subsidised healthcare premiums evidenced a disproportionate increased incidence of superficial injuries and contusions, open wounds, burns and poisonings. Speculation about the basis for this finding could include a difference in environmental issues, such as, less safe housing and neighbourhoods, and perhaps reduced use of safety measures at home and in play. Another reason may be less parental supervision or lack of parental first aid knowledge when treating minor injuries. However, children from families with no healthcare subsidisation; had an increased incidence of dislocations, sprains and strains, and fractures during the teenage years. One possible explanation is children of a higher SES may participate in more organised sports, and/or ride on snowmobiles, all terrain vehicles and cars thereby leading to this type of injury. Interestingly, Lyons et al's. study (2000) in Wales looked at fractures in children and concluded that although the rates were similar in both affluent and deprived areas, the causes were different with the more affluent areas having higher rates of sports related fractures and the poorer areas having more assault related injuries.

The findings from this present study appear to have uncovered an important reason for the variation in the literature on the relationship between SES and childhood injury. The majority of studies found a relationship between poverty and injury (e.g., Faelker et al., 2000; Laing et al., 1999; Durkin et al., 1998 and 1994; Gofin et al., 1993; Jolly et al., 1993). Whereas, other studies showed no evidence of a relationship, for example Addor et al., 1995, whose study demonstrated that socio-economic factors did not influence the occurrence of injury, as did Larson et al's. study (1988) that showed no increase in risk of injury from children of lower income. Examining the type of childhood injury along

with the SES of the family and stratifying this by age presented a clearer picture of the relationship.

The pattern of injury rates during childhood often reflects the various aspects of physical and mental development that influences susceptibility to injury. Several findings were discovered when rate of injuries in relation to age were examined. Two of the major categories of injury, superficial injury and contusions, and open wounds, demonstrated a dramatic rise in incidence about the age of one. During the infant and toddler period of growth there is a rapid and often unexpected increase in motor development; and there is a drive for autonomy and curiosity of the environment, thereby exposing the child to these types of injury. Superficial injury then decreased mildly during the four to eight year old age range before peaking during the teenage years. Often the school-age child seeks social and peer acceptance and will try to prove itself by performing risk-taking behaviour and coupled with an inadequate perception of speed and distance, this may explain the increase in relatively minor injuries. The incidence of open wounds demonstrated a small increase in numbers but maintained an average rate of about 60-70/1000 children through the remaining years studied. Overall, the rates of childhood injury in Alberta during the fiscal year appear very high (e.g., about 300/1000 in the teenage years). Comparison with other studies and publications (e.g., Health Canada, 1997) has not been possible as this study has captured all physician consultations for an injury and previous studies reviewed have only looked at hospitalisations.

There were marked differences when the pattern of injury and gender was analysed. After the age of one, males consistently presented for a physician consultation

more frequently than females for superficial injuries and contusions, and for open wounds. One explanation is that as children become older and more independent minor injuries occur and teenagers, especially males, have a feeling of 'indestructibility'. There was a consistent rise in dislocations, strains and sprains from the age of seven years through to seventeen years in both genders with a peak rate of 120-140/1000 children. Interestingly, the rate of fractures remained consistent between the sexes until fourteen years of age when the incidence of fractures rose sharply in males and remained high until seventeen years. This could be an indicator that males are more prone to this type of injury because of their lifestyle, for example, more contact sports such as, hockey and football. In future years this may change with the increasing popularity of females joining in with traditional 'male stereotype' sports.

When these data were examined in relation to the child's domicile, the analysis showed that a greater rate of urban children regardless of healthcare premium payment presented to a physician with an injury. This is not supported by a previous study performed in Australia (Carey et al., 1992) that concluded that child injury mortality rate was higher in a rural area than a metropolitan area. However, the present study looked at morbidity: therefore no true comparison can be made with Carey et al's. study. The analysis also demonstrated that a slightly greater rate of urban children using healthcare premium subsidies presented to a physician with an injury. This is supported in part by a previous study performed in Manitoba during 1994-1997; Brownell et al., (2002) concluded that injury hospitalisation among children living in Winnipeg, from the low-income areas, had rates 2.5 times higher than from the higher income areas. The same analysis showed evidence that a slightly greater rate of rural children from unsubsidised

families presented with an injury. Brownell et al's study did not support this; they concluded that rural injury hospitalisation rates were almost 3 times higher from the lowest income areas than those from the highest income areas. However, Brownell et al's. study only looked at hospitalisation, and the present study looked at all physician consultations for an injury: therefore no true comparison can be made with these studies.

It appears that 'city' life is more hazardous to low income families than 'country' life in Alberta. Are children from families with subsidised healthcare premiums living in housing that is unsafe? Or, perhaps there are less recreational opportunities in low-income housing areas and this leads to boredom in children and more injuries occur due to inappropriate activities? These questions and others can only be determined if the mechanism of injury is examined.

The results of a Pearson's Chi-square study using SES as the independent variable and the two major cities in Alberta, Edmonton and Calgary as the dependent variables showed evidence of a relationship ($p<0.001$). No previous studies were found that did a comparison between cities in one province of Canada. The analysis demonstrated that overall Edmonton had a larger rate per 1000 children present with an injury to a physician than Calgary. Both Edmonton and Calgary demonstrated a larger rate of healthcare subsidised children presenting to a physician with an injury compared with children with no healthcare subsidies during the fiscal year.

Constraints present on the use of retrospective data depend on what data were collected and how it can be utilised. Unfortunately, there was no means available to determine the mechanisms of the injury with these data. However, these constraints are outnumbered by the advantages of utilising data that explores the individual economic

status (healthcare premium payments); utilisation of diagnostic codes (number of times the healthcare system was accessed for injuries); and physical environment (domicile of the child). Therefore, ecological fallacies were negligible in this study due to the individualisation of the data. This study was not able to differentiate between the "near poor" (families that do not qualify for healthcare premium subsidies) and those families with adequate incomes. In addition, Treaty Status is not necessarily an indicator of poverty; the federal government pays the healthcare premium regardless of the person's income. First Nation people with Treaty Status may be wealthy but often live in a culture of poverty. However, the opportunity to examine individual level measure of SES, with the possibility of small inaccuracies, outweighs the reduced reliability of aggregate data usage. In conclusion, because the vast majority of physicians in Alberta are paid on a fee for service contract, and AHW is responsible for reimbursing physicians for treatments, this was a reliable data set.

Conclusion

Injuries cause much pain and suffering for children as well as their families and this is especially true in areas of socio-economic deprivation. Apart from the child's physical and emotional trauma other costs are evident: medical services, quality of life and loss of future earnings. Unintentional injury consumes large amounts of healthcare resources, not only in the acute phase, but unfortunately some children are left with permanent disabilities requiring long term care in a facility or at home with professional community support. Their quality of life and that of their family is often diminished. Future earnings may be negligible or greatly reduced due to the results of their injury.

The links between poverty and childhood injury are not complete but tend to be connected more to the consequences and causes of poverty. The type and location of housing, exposure to environmental hazards, transportation, opportunities for recreational activities, and childcare are related to individual income. The health behaviour of individuals cannot be understood without taking into account their immediate environmental and social conditions. Children living in poverty or the "near poor" may be more vulnerable to certain types of injury because their caregiver cannot provide a safe environment and/or have poor parenting skills where even basic passive protection is prohibitive. It is easier for more affluent families to act on health promotion and injury prevention advice than poorer families and this tends to widen health inequalities.

Childhood injury is not homogenous, it may occur in the home, on the street, at school or during leisure and has a wide range of causes. The development of effective forms of prevention often depends on understanding the environmental and social living conditions of the population at risk. Without this understanding it is impossible to strengthen the social fabric of this population and change the societal norms to reduce the risk of childhood injury.

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Appendix A
ICD-9 Codes

INJURY AND POISONING (800-999)

Fractures (800-829)
Dislocation (830-839)
Sprains and Strains of joints and adjacent muscles (840-848)
Intracranial injury, excluding those with skull fracture (850-854)
Internal injury of chest, abdomen, and pelvis (860-869)
Open wound of head, neck, and trunk (870-879)
Open wound of upper limb (880-887)
Open wound of lower limb (890-897)
Injury to blood vessels (900-904)
Late effects of injuries, poisonings, toxic effects, and other external causes (905-909)
Superficial injury (910-919)
Contusion with intact skin surface (920-924)
Crushing injury (925-929)
Effects of foreign body entering through orifice (930-939)
Burns (940-949)
Injury to nerves and spinal cord (950-957)
Certain traumatic complications and unspecified injuries (958-959)
Poisoning by drugs, medicinal and biological substances (960-979)
Toxic effects of substances chiefly non-medical as to source (980-989)
Other and unspecified effects of external causes (990-995)
Complications of surgical and medical care, not elsewhere classified (996-999)

Appendix B
Recoding of Injury

Fractures	800-829
Dislocations, sprains and strains	830-848
Intracranial injury	850-854
Internal injury of chest, abdomen and pelvis	860-869
Open wounds	870-897
Injury to blood vessels	900-904
Superficial injury and contusions	910-924
Crushing injury	925-929
Foreign body	930-939
Burns	940-949
Injury to nerves and spinal cord	950-957
Poisoning	960-989
Others	905-909
	958-959
	990-999

Running head: POVERTY AND CHILDHOOD INJURY

Chapter 4 - Paper III

Poverty and Childhood Injury:

Parental Perceptions of the Risk of Childhood Injury and the Use of Safety Measures

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CHAPTER 4

Parental Perceptions of the Risk of Childhood Injury and the Use of Safety Measures

Introduction

Unintentional childhood injuries are recognised in Canada as a major health problem and the leading cause of death in children and youth less than 20 years of age (Health Canada, 1997). A complex group of factors can contribute to an unintentional injury; apart from the person involved and the injury-inducing agent there are environmental, behavioural and social factors can all contribute to the occurrence of injury.

Common childhood injuries include motor vehicle collisions (MVC), drowning, suffocation, burns, falls, and poisonings. Injuries that hospitalise children vary significantly across different age groups (Alberta Safe Kids, 1993). Variations in injury rates during childhood partly reflect different aspects of physical and mental development that influence susceptibility to injury. These include the recognition of hazards, curiosity, and the ability to perform certain tasks. Certain factors beyond the child's influence can also contribute to injuries, such as living in unsafe housing and neighbourhoods. The high death rate and injury rates in children are due in part to their inability to recognise hazards and protect themselves.

Childhood injury prevention is ultimately the parent or caregivers' responsibility. Acceptance of risk is a fundamental part of life for most individuals, but people differ in their judgement of what risks are acceptable. There also appears to be an 'optimism bias' where adults believe falsely that children have the knowledge and skills necessary

to prevent injury. Eichelberger et al. (1990) in their survey 'Parental attitudes and knowledge of child safety' recognised the fact that for many types of childhood injury prevention strategies there are limited passive intervention methods and that control relies on changing human behaviour. Are people of low-income as aware of these dangers as higher-income people, but due to circumstances beyond their control unable to take appropriate safety measures to prevent possible childhood injury?

Purpose

The purpose of this paper is to assess parental perceptions of the risk of childhood injury and the use of safety measures. Using data from a self-administered questionnaire this study addressed three research questions: (1) What are the most common parental perceptions of risk factors for childhood injury? (2) What safety measures do parents use to prevent childhood injuries? (3) What is the relationship between selected socio-economic status (SES) indicators and parental perceptions of risk factors for childhood injury and safety measures taken by parents?

Method

An anonymous, self-administered questionnaire (Appendix A) was completed by parents and/or caregivers[1] of children admitted to a tertiary healthcare centre with an unintentional injury during a five-month period. The questionnaire was designed to assess parental perceptions of the risk of childhood injury and their use of child safety measures.

Participants

The study sample consisted of parents whose child, age 0 to 16 years, accessed the Stollery Children's Hospital, in Edmonton, Alberta, between 21st February 2002 and

24th July 2002, with an unintentional injury. Participants met the following inclusion criteria, (1) had at least one child, aged 0 to 16 years admitted to the hospital, and (2) understood written English. Participants were excluded if their child was admitted to an intensive care setting.

Procedure

Posters about the study were displayed in prominent areas on the paediatric units and in the paediatric emergency (Appendix B). The research study was also brought to the attention of the potential participants by the paediatric staff. An information letter was attached to the questionnaire explaining the study, along with an addressed envelope (Appendix C). The parent of the child was requested to complete the questionnaire anonymously, place it in the envelope provided and put it in a container at the nursing desk. The researcher periodically emptied these containers.

Measures

Demographics. Respondents took approximately 10 to 15 minutes to complete the questionnaire. Demographic data included: place of residence, number of adults and children in the home, the age of the participant, parent's marital status, parent's level of education, parent's occupation, household annual income, and the age and gender of the child brought into the hospital.

Injury. Questions were asked about the nature of the child's injury, if the injury required an overnight stay in the hospital, and how many times the child had seen a healthcare provider in the past year for an injury.

Safety. Closed and open-ended questions were asked regarding the parent's knowledge, attitudes and beliefs related to childhood injury risk, and what safety

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[1] Parents and/or caregivers will be referred to in all subsequent text as the parent.

measures were used in the home. The questionnaire was developed on the basis of previous surveys. Two questions examined the parent's knowledge about what they thought were the most serious health risks for their child(ren) (Alberta Safe Kids Campaign, 1994; Eichelberger et al, 1990), and the most common cause of death in children (Root, 1996). A question was asked about the preventability of childhood injuries (Root, 1996; Eichelberger et al, 1990). An open-ended question asked the respondent to list what they thought as the most important safety rules that their child should know (Sparks et al, 1994). A further question asked the respondent to name specific actions they had taken in the last year to reduce the likelihood of childhood injuries (Evans et al, 1997; Eichelberger et al, 1990). Closed and open ended questions asked the parent about their beliefs and perceptions of home and neighbourhood safety and what improvements could be made (Evans et al, 1997; Sparks et al, 1994; Colley, 1994).

The final questions asked the respondent about sources of safety information (Evans et al, 1997; Alberta Safe Kids Campaign, 1994; Colley, 1994), and an open ended question asked the respondent to list the type of information on child safety that would be most helpful to them (Eichelberger et al, 1990).

Results for Quantitative Data

This section of the chapter details the quantitative results of the closed ended questions of the 80 useable questionnaires returned. The analysis of the closed-ended questions was performed using the Statistical Package for Social Sciences (SPSS) 10.

Demographic Characteristics

Table 4-1 outlines the demographic characteristics of the respondents.

Table 4-1
Demographic Characteristics of the Sample

Variable	N	%
Gender of child		
M	55	68.8%
F	25	31.3%
Age of the child		
Less than one year	1	1.3%
1 to 4 years old	20	25%
5 to 9 years old	13	16.3%
10 to 14 years old	40	50%
Over 14 years old	6	7.5%
Place of residence		
City	50	62.5%
Town (population 4,000 or greater)	8	10%
Small town, hamlet, farm (population under 4,000)	22	27.5%
Number of adults (18years and older) in the household		
1	5	6.3%
2	69	86.3%
3	4	5%
4	2	2.5%
Number of children (under 18 years) in the household		
1	16	20%
2	32	40%
3	20	25%
4	5	6.3%
5	5	6.3%
6	1	1.3%
No response	1	1.3%
Age of respondent		
Less than 20 years	3	3.8%
20 to 29 years	9	11.3%
30 to 39 years	33	41.3%
40 to 49 years	31	38.8%
50 years or greater	4	5%

Variable	N	%
Marital status of respondent		
Never married	3	3.8%
Married/common-law	69	86.3%
Separated/divorced/widowed	8	10%
Educational attainment of the respondent		
Elementary	1	1.3%
Some junior high or high school	7	8.8%
Completed high school	15	18.8%
Some post-secondary, e.g. college, university, tech.	19	23.8%
institute	38	47.5%
Completed post-secondary		
Occupation of the respondent		
Semi skilled or general labour	5	6.3%
Skilled labour	9	11.3%
Office, clerical, administrative support staff	11	13.8%
Professional, managerial or executive staff	38	47.5%
Full-time homemaker or caregiver	12	15%
Student	2	2.5%
Unemployed	1	1.3%
Retired	1	1.3%
More than one response	1	1.3%
Total annual household income before taxes in 2000		
Less than $15,000	7	8.8%
$15,000 to $29,999	6	7.5%
$30,000 to $44,999	16	20%
$45,000 to $60,000	10	12.5%
Greater than $60,000	39	48.8%
No response	2	2.5%

Severity of the Injury and Pattern of Injuries in the Past Twelve Months

Two questions assessed the severity of the child's injury and the pattern of injuries. Table 4-2 indicates that 66% of the respondents' children seen in Emergency needed admission to the hospital for at least an overnight stay. Over 36% of the respondents had a child who had seen a physician for at least one previous injury in the last 12 months, and of those 15% had a history of two or more episodes of injury.

Table 4-2
Severity of Injury and Pattern of Injuries in the Last 12 Months

Variable	N	%
Overnight stay		
Yes	53	66.3%
No	27	33.7%
Number of times seen by a physician in the last 12 months for an injury		
None	51	63.7%
One time	17	21.3%
Two or more times	12	15%

Parental Perceptions of Risk Factors for Childhood Injuries

Table 4-3 illustrates what the respondents thought was the most common cause of death in children in Canada aged 0 to 14 years of age and what they saw as the most serious health risk for their child. The majority of the respondents stated accidental or unintentional injuries to both questions (80%).

Table 4-3
What Parents Saw as the Most Common Cause of Death in Children and the Most Serious Health Risk for Their Child

Variable	N	%
Common cause of death in children (age 0 to 14) in Canada		
Childhood illnesses or diseases, e.g. cancer, asthma, etc.	9	11.3%
Accidental or unintentional injuries, e.g. falls, MVC, etc.	64	80%
Child abuse or neglect	1	1.3%
Health problems they were born with, e.g. heart disease etc.	3	3.8%
No response	3	3.8%
Most serious health risk for your child		
Childhood illnesses or diseases, e.g. cancer, asthma, etc.	10	12.5%
Accidental or unintentional injuries, e.g. falls, MVC, etc.	64	80%
Health problems they were born with, e.g. heart disease, etc	1	1.3%
Other health risks	1	1.3%
No response	2	2.5%
Two responses	1	1.3%
All	1	1.3%

Illustrated in Table 4-4 are the parental perceptions of risk factors for unintentional childhood injuries. This included a question about the preventability of childhood injury, 10% of the respondents thought injuries are always preventable. The other question asked was about the location of most childhood injuries, 40% thought most injuries occur in the home.

Table 4-4
Parental Perceptions of Risk Factors for Unintentional Childhood Injuries

Variable	**N**	**%**
Are accidental injuries to children preventable?		
Never preventable	0	0%
Rarely preventable	2	2.5%
Sometimes preventable	32	40%
Most of the time they are preventable	38	47.5%
Always preventable	8	10%
Where do most childhood injuries occur?		
In the home	32	40%
At school	3	3.8%
On the street	4	5%
In playgrounds or play areas	17	21.3%
In cars or other motor vehicles	4	5%
Playing sports	12	15%
Other	1	1.3%
More than one chosen	7	8.8%

Table 4-5 illustrates the respondents' thoughts on the safety of their home and neighbourhood. The majority of respondents (77.6%) thought that a few (n =43), or some (n = 19), safety improvements could be made to the home. No respondent thought their neighbourhood was not safe at all, over 53% felt their neighbourhood was safe (n = 43) and over 26% thought it was somewhat safe (n = 21).

Table 4-5
Home and Neighbourhood Safety

Variable	N	%
Home safety improvement		
None	13	16.3%
A few safety improvements could be made	43	53.8%
Some safety improvements could be made	19	23.8%
Quite a few safety improvements could be made	2	2.5%
A lot of safety improvements could be made	2	2.5%
No response	1	1.3%
Neighbourhood safety		
Very safe	13	16.3%
Safe	43	53.8%
Somewhat safe	21	26.3%
Not so safe	2	2.5%
Not safe at all	0	0%
No response	1	1.3%

Source of Child Safety Information

The respondents chose a variety of sources for information about child safety. Many parents (n = 32) stated they utilised more than one source for pertinent information. Table 4-6 illustrates this response to the question.

Table 4-6
Source of Child Safety Information

Variable	N	%
Source of child safety information		
Books, magazines, newspapers	15	18.8%
Television, radio, Internet	14	17.5%
Doctors, nurses or other healthcare professionals	6	7.5%
Child's school	2	2.5%
Friends or family	3	3.8%
Other sources	3	3.8%
More than one source	32	40.1%
No response	5	6.3%

Results for Qualitative Data

While the closed-ended quantitative findings provided a valuable, basic level of information about SES and unintentional childhood injuries, open-ended results allowed for a qualitative analysis of the study. The open-ended questions were used to identify the type of injury(s) the child received and for them to be coded using the "International Classification of Diseases, 9th. Revision, 4th Edition, Clinical Modification" (ICD 9) (Appendix D.). Also explored were parents' views on the most important safety rules that their children needed to know, and what specific actions they had taken in the past year to reduce the likelihood of childhood injuries. The close-ended questions regarding home and neighbourhood safety were expanded with open-ended questions about how the respondent could make the home safer and what they would like to see happen to make the neighbourhood safer. Finally, the parent was asked what specific type of information on child safety would be most useful to them after the question was posed about which source they used for this information.

The second section of this paper describes the responses to these open-ended questions utilising a thematic analysis. While prior research driven codes were used to analyse the type of injuries sustained, data-driven codes (inductive coding) were developed to analyse the information given by the respondents to the other open ended questions.

What Injury(s) Has Your Child Received?

Parents were asked to name the type of injury(s) the child had received. A variety of terminology was used, some respondents used the correct medical terminology, for example, "fracture of the right femur", while other respondents used more everyday

language, for example, "broken leg". The majority of respondents were quite specific on the type of injury their child had received but others were vague, for example, "broken bones". The information was then coded, where possible, using the ICD 9 classification of disease and injury, in particular "Injury and Poisoning" (800-999). By using the ICD 9 classification to code the raw data "the researcher is building on prior research that has established valid codes" (Boyatzis, 1998, p.37). The use of this prior research driven code allows for interrater reliability and established valid codes while accepting the biases of the codes.

Table 4-7 outlines the ICD 9 codes along with the number and percentages of these injuries. A Pearson's chi-square test performed on the data using low SES and high SES as the independent variable and the incidence of fractures as the dependent variable showed no evidence of a relationship ($p>0.05$).

Table 4-7
Types of Reported Injuries

Type of Injury	ICD 9 code	Frequency	Percentage
Fractures	800-829	40	50%
Dislocation, sprains and strains	830-848	6	7.5%
Intracranial injury	850-854	1	1.3%
Internal injury	860-869	6	7.5%
Open wounds	870-897	9	11.3%
Superficial injury and contusions	910-924	12	15%
Burns	940-949	1	1.3%
Uncodeable		5	6.3%

What Are the Most Important Safety Rules That Children Need to Know?

This question allowed respondents to cite safety rules they felt were important to their child(ren). Responses differed largely because of the age of the child, for example,

"no bathing alone when small…" (Participant 41, see Appendix E), and in some cases due to the domicile of the family, for example, "children need to know the possible hazards specific to their environment - rural will have very different (and some the same) hazards than urban children..." (Participant 12).

Coding of the information given by the respondents was performed inductively using thematic analysis (Boyatzis, 1998). This allowed the researcher to develop themes and a selection of subsamples, and to determine valid differences. Three major themes were evident after reading the comments: instructions, equipment and parental involvement. Table 4-8 highlights the themes for this question.

Table 4-8
Themes Describing the Most Important Safety Rules That Children Need to Know

Theme	N	%
Obey instructions	57	63%
Use proper equipment	24	27%
Parental involvement	9	10%

Obey instructions. The parents frequently used instruction to cite safety rules that their children needed to know. The theme 'obey instructions' describes a method of educating the child, a way of teaching their child not to take risks, teaching the child to "play safe", or of thinking before taking action.

Parents used education as an important safety rule for children. Phrases used were "obey" (Participant 2), "look before crossing the street" (Participant 9), "don't play with matches" (Participant 24), "be careful" (Participant 31), "don't talk to strangers" (Participant 33) and "don't play on the street" (Participant 39).

Parents of teenage children sometimes used risk taking in describing safety rules for children. Other comments utilised were "showing off" (Participant 53), and "don't imitate things off of TV" (Participant 76).

The phrase "play safe" (e.g. Participant 6, Participant 21, and Participant 48) was commonly used by the parent for this question.

Think before acting was identified as a subsample and was commonly used by parents of teenagers. Other comments quoted were "think prior to action" (Participant 44), "try to determine the probability of injuries" (Participant 30), and "think things out before doing unfamiliar tasks" (Participant 40).

Use proper equipment. This theme describes any equipment used to prevent childhood injuries described by the parents and was divided into three subsamples: helmets, seatbelts and sports equipment.

Helmets were a very commonly used subsample with parents of children from all the age groups (e.g. Participant 3 and Participant 45). Seat belts were quoted occasionally when describing safety rules for children (e.g. Participant 38, and Participant 61). Sports equipment or appropriate equipment for activity was frequently quoted by the parent, (e.g. Participant 4 and Participant 25).

Parental involvement. 'Parental involvement' includes any strategy that the parents used to remove the risk of injury to their child and the use of adult supervision to ensure the safety of their child.

Removal of the risk of injury was only quoted once by a respondent for this question, "as adults we must recognize these hazards & prevent them from being a problem either by education or removal of the risk where possible" (Participant 12).

Because of the importance of this rule, in so far as the parent took an action to prevent injury, it was included as a subsample.

Adult supervision was used as an example of parental involvement when parents quoted "do not touch appliances or tools without adult supervision" (Participant 53) or "never be by lake without adult" (Participant 42).

What Specific Actions Have You Taken in the Last Year to Reduce the Likelihood of Childhood Injuries?

This question was posed to elicit information from the respondents as to what actions had been taken recently to prevent childhood injuries. Again the responses differed widely depending on the age of the child(ren), for example, "plug covers" (Participant 8), and "review fire safety and what to do in case of a fire" (Participant 13). Three themes were evident after reading the comments: instruction, preventive measures and supervision as displayed in Table 4-9.

Table 4-9
Themes Describing Specific Actions That Have Been Taken in the Last Year to Reduce the Likelihood of Childhood Injuries

Theme	**N**	**%**
Instruction	27	34%
Preventive measure	40	51%
Supervision	12	15%

Instruction. This theme is described as any instruction the parents have given their child(ren) in the form of education or rules. Respondents to this question relied heavily on educating their child(ren) on methods to reduce injuries Quotes included "education of the dangers", (Participant 14),"told the kid about the risk and what they should look

out for not to get hurt" (Participant 23), and "awareness of ATV & operations of" (Participant 40).

A few of the respondents stated they had rules that the child had to follow, for example, "talk and explain safety rules" (Participant 29), and "new rule: no helmet - no snowboarding, no helmet - no biking" (Participant 53).

Preventive measures. This theme was divided into two subsamples to describe what the parents did to reduce the incidence of child injuries by creating a safer environment: equipment and action. The subsample equipment included equipment purchased such as helmets for various sports such as cycling and snow boarding (e.g. Participant 7), and sports equipment for rollerblading (Participant 57). Homes have been child proofed by installing baby gates on stairs (Participant 10) and putting on electrical outlet plugs (Participant 9).

Many respondents quoted the actions they had taken in the last 12 months to prevent injuries. Examples include, "no smoking in the house" (Participant 33), "all climbable branches have been cut off our trees" (Participant 20), and "locking up harmful products at home" (Participant 1).

Supervision. The 'supervision' theme includes for the most part parental involvement, either in the child's sports activities or in everyday activities. The parents quoted "monitoring activities and limiting risk taking behaviour" (Participant 34), "never start the car without everyone buckled up" (Participant 61), and "I try and avoid leaving them unsupervised" (Participant 64).

What Would Make Your Home Safer?

This question was posed after asking the respondent was asked if safety in the home could be improved. The parent was asked to think about what in the home could be changed to make it safer. The two themes taken from the answers were: parental involvement and equipment. These are displayed in Table 4-10.

Table 4-10
Themes Describing What Would Make the Home Safer

Theme	N	%
Parental involvement	10	22%
Equipment	35	78%

Parental involvement. This theme is described as what the parents would do to ensure the safety of their child(ren) whether through instruction or supervisory precautions.

Instruction was used rarely as an answer for this question. The respondent answered it with comments like "more safety instruction" (Participant 2) and "have family safety meetings (discussions)" (Participant 56).

Parents responded to this question with various supervisory precautions, for example, "pay more attention to what kids are doing" (Participant 17), "increased supervision" (Participant 32), and "more eyes in the back of my head" (Participant 79).

Equipment. This theme was utilised frequently by the respondents, it included any equipment that would be purchased or redesigned, the checking of existing equipment or the removal or safe storage of equipment or goods.

The parent/caregiver itemised equipment that could be purchased to make the home safer, these ranged from minor equipment to major expenses. Examples include,

"lock on hot tub" (Participant 24), "rope ladders for children's' bedroom in case of fire" (Participant 13), "lessen the steepness of the staircase" (Participant 38), to "building a new one" (Participant 78).

Many parents noted that checking existing equipment in the home would make it safer for the family. These included, "have hot water temp. checked" (Participant 19), "gate across stairs always" (Participant 9), check smoke detectors more regularly" (Participant 61) and "less clutter" (Participant 69).

The respondents noted that by removing or safe storage of equipment or goods in the home would make it safer. Examples include, "lock up cleaning products" (Participant 1), "secure to wall tall free standing bookshelf" (Participant 8), "get rid of candles" (Participant 18), "make sure bathroom door closes properly so child can't access tub/toilet" (Participant 41) and "lock hot tub cover" (Participant 68).

What Would Make Your Neighbourhood Safer?

The respondents were asked what would make their neighbourhood safer after a question about how safe they thought their neighbourhood was for their children. This open-ended question was analysed thematically and four major themes were found to be evident: supervision, equipment, laws and neighbourhood. Table 4-11 describes the themes developed from this question.

Table 4-11
Themes Describing What Would Make the Neighbourhood Safer

Theme	**N**	**%**
Supervision	14	25%
Equipment	12	22%
Laws	22	40%
Neighbourhood	7	13%

Supervision. The theme supervision is described as any adult supervision that would make the neighbourhood safer. Three types of supervision were recognised by the respondents to this question and therefore used as subsamples: police presence, parents and neighbourhood watch.

Police presence was listed for a variety of reasons among the parents, for example, "police patrols for speeding" (Participant 10) and "more RCMP presence i.e. drinking & driving" (Participant 58).

A few respondents stated that they wanted more parental supervision from other parents in the neighbourhood, "control of behaviour of 1 or 2 kids that threaten the safety of others" (Participant 34) and "parents watching their kids better" (Participant 80).

A few parents stated that the neighbourhood would be safer if there was a "more organized, better" or "more" neighbourhood watch programme (Participant 69 and Participant 73).

Equipment. This theme covers any equipment the parent thought would improve the safety of their neighbourhood. The respondents stated a small variety of equipment would improve neighbourhood safety and this was divided into four subsamples: fencing, lighting, playgrounds and speed bumps.

A few parents mentioned fencing as a method of improving neighbourhood safety, this ranged from fencing a nearby lake (Participant 33) to yard fencing (Participant 63).

The lack of lighting was clearly a concern for parents regarding the safety of their children. General lighting on acreages and city streets as well as crosswalk lights were mentioned (e.g. Participant 66).

Respondents mentioned the need for better playgrounds (Participant 7), better playground equipment, (Participant 37) or more playgrounds (Participant 31) when it came to neighbourhood safety.

Several parents mentioned the need for speed bumps on the road or in the alleys (e.g. Participant 20).

Laws. This theme was utilised when any respondent mentioned laws regarding traffic to improve neighbourhood safety. This theme was divided into two subsamples: speed limits and zoning.

Parents stated that safety could be improved by "slowing traffic down" (Participant 1), "lower speed limits" (Participant 33) or "enforced speed limits" (Participant 31).

A variety of suggestions were made for rezoning or more signs in the neighbourhood to make it safer for children. Examples include, "more off street parking" (Participant 34), "children at play signs" (Participant 42), "no oilfield traffic allowed" (Participant 55) and for people to "obey the playground zone" (Participant 8).

Neighbourhood. A few respondents mentioned that by moving to an acreage (Participant 14), quiet crescent (Participant 3) or a dead end street (Participant 78) would be safer for their children. Also one parent recognised that construction in their neighbourhood was a risk for the child (Participant 25).

What Specific Type of Information on Child Safety Would Be Most Helpful to You?

Although this question was aimed at the parent many respondents thought their child needed the information. The parent wanted to know the best way to impart this knowledge about child safety to their child. Therefore, two major themes were

recognised: information for parents and information for children as illustrated in Table 4-12.

Table 4-12
Themes Describing the Most Helpful Type of Child Safety Information

Theme	N	%
Information for parents	26	70%
Information for children	11	30%

Information for parents. This theme was used if the parent requested any type of information they personally needed. The respondents requested a wide variety for information about child safety. The theme was divided into 5 subsamples: house/farm, neighbourhood, sports, children's products and brochures/fact sheets.

Information was requested about house and farm safety and included "specific information about house safety issues" (Participant 7), "child proofing your home, yard and garden" (Participant 10), and "farm safety" (Participant 23).

The requests about neighbourhood safety extended to "water safety" (Participant 79) as well as "accidents in the playground" (Participant 35), and "street safety" (Participant 25).

A few parents wanted information about "common types of injury & prevention for those related sports" (Participant 19), and general sports injury information (Participant 73).

One parent/caregiver wanted information on how to keep updated on the safety of children's products (Participant 76).

Several parents requested information on child safety in the form of fact sheets or brochures (e.g. Participant 32). They also requested research data, for example, "the

outcomes of using safety precautions, data to show that i.e. helmets save head injuries, hockey, bikes, proper equipment saving injuries i.e. shin pads for soccer" (Participant 18) and "statistics on where/when most accidents happen etc." (Participant 42).

Information for children. The parent often requested information for the child that would capture the child's attention and encourage them to take responsibility for their behaviour. For example, "information that would interest and capture the attention of the children that feel invincible" (Participant 24), and "how to convince my children to apply safety precautions when they are perceived not to be 'cool', e.g. wearing a helmet" (Participant 30). The information was requested for every age group as evident by one parent requesting "something aimed at children - colourful or to be coloured & read to child" (Participant 33).

Discussion

The findings from this survey indicate that parents who brought their child to the Stollery Children's Hospital for an unintentional injury hold similar perceptions of risk factors for childhood injury despite differences in annual income. Participants' knowledge about the risk of childhood injury and their preventability was also similar regardless of SES.

The majority of the parents, regardless of SES, thought that accidental injuries are preventable most of the time; this is supported by Eichelberger et al (1990) who wrote, "most parents think that serious injuries (or, the alternative wording, accidents) are preventable" (p.715). However, this is not supported by Root's (1996) report that states Aboriginals were less certain about the control they have in preventing injuries and only 11% said that injuries were very preventable, or by Klauber et al. (1986) who

demonstrated that many respondents with low income and education believed that injuries could not be prevented or were a matter of fate. Thirty-six percent of the children were reported as having at least one previous injury in the last 12 months. This injury pattern is a concern, but unfortunately no comparison can be made from previous literature.

Surprisingly, the majority of respondents described their home and neighbourhood as being safe. Evans et al. (1997) study indicated that children from lower SES backgrounds might be faced with greater environmental hazards making prevention of unintentional injuries tougher.

Most of the respondents chose a variety of sources for information on child safety. Rarely were healthcare professionals chosen as a main source of knowledge on child safety information (7.5%), this was also found in the study performed by Alberta Safe Kids Campaign (1994) where only 8.3% obtained information from their family doctors or paediatrician. This differs from Eichelberger et al's. (1990) study that found that "Parents look to the medical professions for leadership in child safety" (p.719). A reason for the lack of professional usage in Alberta could be because of the healthcare's emphasise on curing disease rather than preventative measures being incorporated into healthcare services.

The qualitative findings in this study were informative about the parental perceptions and attitudes about childhood injury: the safety rules that children needed to know, the types of safety precautions that had been instigated in the last year, the methods used to make the home and neighbourhood safer, and the type of information on child safety that would be most helpful. The most common injury cited by the

respondents was fractures (50%), followed by superficial injury and contusions (15%), these were also the two of the most common types of injury found in the Alberta Health and Wellness data on childhood injury for the fiscal year 1995-96.

Overwhelmingly the parents stated that they used 'obey instructions' to cite safety rules that their children needed to know (71%). However, this method of imparting safety rules may not be enough to protect a child from injury; this is supported by Eichelberger et al. (1990) who stated, "Many parents hold the mistaken belief that being careful is sufficient to protect their children from injury" (p.719). The provision of safety equipment was quoted by 30% of the parents as a method of imparting protection to the child.

The majority of respondents quoted they created a safer environment for their child in the last year to reduce child injury (51%). This involved purchasing equipment for sports or for the house, and/or taking preventive actions like locking up harmful substances. Unfortunately, this method may be prohibitive for families on a reduced budget; Ueland et al. (1996) study demonstrated that income is a predictor of adopting safety measures.

The question on home and neighbourhood safety elicited answers that included better supervision of their children. Children from lower SES families often have only one adult member present in the household and this can lead to less supervisory measures being present. Equipment was mentioned as a method for improving home and neighbourhood safety, again this might often depend on the family's financial status. Enforcement or more restrictive roadway laws was deemed important to over one quarter of the parents as a method to increasing the safety of their neighbourhoods. This

recognition of the value of laws bodes well for future changes in child safety such as helmets for various activities and age restrictions for all terrain vehicles.

The final question on the survey asked the parent what type of information on child safety would be most helpful to them, surprisingly about a third of the respondents that replied to this question wanted the information to be geared for their child so that it would capture their interest and encourage them to take some responsibility for their actions. The information the parents requested for themselves tended to be specific information rather than generalities, for example, water safety.

There were weaknesses and biases to this study. Participation in the study was voluntary and this could lead to a self-selected sample bias, such as, people from lower SES may not like to answer questionnaires. In addition, this study was limited by the fact that the questionnaire was not introduced to the parent by the researcher; to ensure anonymity the answers were not confirmed by other means. The study also relied on self-reported behaviours, for example, the use of safety equipment reported by the parents may indicate what parents think they should do rather that what is actually practised, and again, independent validation was not possible.

A possible limitation of the study is the selection of the study population, as it was based at one hospital. However, the hospital chosen was the main tertiary children's hospital in Edmonton, and its catchment's area included northern Alberta, parts of northern British Columbia and of northern Saskatchewan, areas of the North West Territories, Yukon and Nunavut. This provided a mixture of urban and rural families as well as people from all social gradients. However, this study site may not be a true representation of the population; only 16.3% of the respondents lived in poverty

compared with data from Health Canada (1999) that estimated 24% of children under the age of 15 years live in impoverished conditions.

Conclusions

Childhood injury prevention ultimately depends primarily on the actions of adults. Parents often give children characteristics of why there is an added risk of injury, for example, the development level of the child, the personality traits of the child or the gender of the child. A survey performed in England demonstrated that the majority of parents, teachers and police officers place the blame for pedestrian injuries on the child (Rivara et al., 1989). If we are going to make the child responsible then it is up to adults to give children the skill, knowledge and attitudes to be able to properly judge risks and have options on how to respond. If this is learnt early in life it will provide the child with a sound basis for future years. Consequently, we need to educate and empower the parent to practise adequate childhood injury prevention as well as provide information to children that will capture their interest about preventing injury.

If there is the belief that the risks of injuries are not controllable then more has to be done to teach parents about the hazards and possible preventative methods available. However, if the parent believes that injury is somewhat under their control then more needs to be done to encourage the parent to take greater precautions to prevent childhood injury. If the parent has a better understanding of childhood developmental milestones and the significance of these in the role of injury potentials then this may result in more supervision and childproofing, especially in the home. This is particularly important in aboriginal communities where the common belief is that the child learns to

avoid the risk after the injury (Root, 1996). Parents can have a significant impact by teaching children to avoid risk taking.

There is limited understanding of the reasons for the differential risk of injuries in certain population groups. However, if low SES is a significant factor of more injuries it is often a signal of the probability that there are other characteristics present in the home that predisposes the child to injury. Are parents inadvertently expecting the child to have more skills for the task at hand, especially those parents that are younger and those with lower educational levels? Are the inaccurate perceptions of risk of injury inhibiting the parent from organising the child's environment to make it safe? Do people living in lower income families and neighbourhoods need to compensate for the risks endemic in their environment? These questions may need to be addressed by focusing on certain populations for injury control measures, both passively and actively, in education, environment and legislative methods.

The challenge of educating and empowering the parent depends on local community knowledge and understanding the dynamics of local injury data and of those perceived to be at risk. For example, "Gift of Safety" (Injury Control Alberta, 2000) was a local community initiative taken by the Chinook health region that developed to help keep children from dying or being injured in MVC's. Community based programmes can be effective if they are integrated and adopted by the community to address unique community characteristics, for example, poverty. Commitment to any programme needs to be made by local planners as well as local healthcare authorities.

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Appendix A

PAEDIATRIC PATIENT PARENT/GUARDIAN QUESTIONNAIRE

Thank you for taking the time to complete this questionnaire on childhood injuries. In order to maintain individual privacy, do not write your name, address or phone number anywhere on the questionnaire. Drop completed questionnaires in the box by the nurses' station or give it to your child's nurse.

Instructions: Check one answer only for each question unless otherwise instructed.

1. Where do you live?

- ❑ City
- ❑ Town (population 4,000 or greater)
- ❑ Small town/hamlet/farm (population under 4,000)

2. How many adults (18 years and older) live in your household?

_____ number adults

3. How many children (under 18 years) live in your household?

_____ number children

4. Which of the following categories best describes your age?

- ❑ Less than 20 years
- ❑ 20 to 29 years
- ❑ 30 to 39 years
- ❑ 40 to 49 years
- ❑ 50 years or greater

5. What is your marital status?

- ❑ Never married
- ❑ Married/Common-law
- ❑ Separated/Divorced/Widowed

6. What is the highest level of education you completed?

- ❑ Elementary
- ❑ Some junior high or high school
- ❑ Completed high school
- ❑ Some post-secondary, e.g. college, university or technical institute
- ❑ Completed post-secondary, e.g. college, university or technical institute

7. Which of the following categories best describes your work?

- ❑ Semi skilled or general labour
- ❑ Skilled labour
- ❑ Office, clerical, administrative support staff
- ❑ Professional, managerial or executive staff
- ❑ Full-time homemaker or caregiver
- ❑ Student
- ❑ Unemployed
- ❑ Retired

8. What was your total annual household income before taxes in 2000? (Include all adults in the household financially responsible for the child in hospital)

- ❑ Less than $15,000
- ❑ $15,000 to $29,999
- ❑ $30,000 to $44,999
- ❑ $45,000 to $59,999
- ❑ Greater than $60,000

9. What do you think is the *most common* cause of death in children in Canada ages 0 to 14 years?

- ❑ Childhood illnesses or diseases, e.g. cancer, asthma, etc.
- ❑ Accidental or unintentional injuries, e.g. falls, motor vehicle crashes, etc.
- ❑ Child abuse or neglect
- ❑ Health problems they were born with, e.g. spina bifida, heart disease etc.
- ❑ Other causes of death

10. What do you see as the *most serious* health risk for your child?

- ❑ Childhood illnesses or diseases, e.g. cancer, asthma, etc.
- ❑ Accidental or unintentional injuries, e.g. falls, motor vehicle crashes, etc.
- ❑ Child abuse or neglect
- ❑ Health problems they were born with, e.g. spina bifida, heart disease etc.
- ❑ Other health risks, please specify _____

11. How old is your child in hospital?

- ❑ Less than one year
- ❑ 1 to 4 years old
- ❑ 5 to 9 years old
- ❑ 10 to 14 years old
- ❑ 0ver 14 years

12. What is the sex of your child in hospital?

- ❑ Male
- ❑ Female

13. What injury(s) has your child received?

14. In the last 12 months, how many times has your child seen a doctor for an accidental injury prior to this event?

- ❑ None
- ❑ One time
- ❑ Two to four times
- ❑ Five or more times

15. To what extent do you think accidental injuries to children are preventable?

- ❑ Never preventable
- ❑ Rarely preventable
- ❑ Sometimes preventable
- ❑ Most of the time they're preventable
- ❑ Always preventable

16. Where do you think most childhood injuries occur?

- ❑ In the home
- ❑ At school
- ❑ On the street
- ❑ In playgrounds or play areas
- ❑ In cars or other motor vehicles
- ❑ Playing sports

17. What are the most important safety rules that children need to know?

18. What specific actions have you taken in the last year to reduce the likelihood of childhood injuries?

19. To what extent do you feel safety in your home could be improved?

- ❑ Not at all
- ❑ A few safety improvements could be made
- ❑ Some safety improvements could be made
- ❑ Quite a few safety improvements could be made
- ❑ A lot of safety improvements could be made

20. What would make your home safer?

21. How safe do you think your neighbourhood is for your child?

- ❑ Very safe
- ❑ Safe
- ❑ Somewhat safe
- ❑ Not so safe
- ❑ Not safe at all

22. What would make it safer?

23. Where do you get most of your information about child safety?

- ❑ Books, magazines, newspapers
- ❑ Television, radio, internet
- ❑ Doctors, nurses or other health care providers
- ❑ Child's school
- ❑ Friends or family
- ❑ Other sources

24. What specific type of information on child safety would be most helpful to you?

Thank you for completing this questionnaire. Your participation is greatly appreciated. Please drop it in the box by the nurses' station or hand it to the unit clerk.

Appendix B

DO YOU HAVE A CHILD IN HOSPITAL WITH AN INJURY?

Research Study:

"Poverty and Unintentional Childhood Injuries"

Purpose: The purpose of the study is to look at what parents think about the risks of childhood injury and what may stop children from being hurt.

Who qualifies? Anyone who brought his or her child into the hospital for any unintentional injury, e.g., grazes, sprains, broken limbs, accidental overdoses, etc.

What will the study accomplish? The knowledge gained about childhood injuries may help prevent children having unintentional injuries.

How to participate: Complete a short written questionnaire, found at the desk, and place it in the box provided. To maintain complete privacy no names are to be used.

For more information contact:

Susan Gilbride, RN, BN at 407 3337.

Appendix C

INFORMATION LETTER

PROJECT TITLE: Poverty and Unintentional Childhood Injuries.

INVESTIGATOR: Susan Gilbride, RN, BN, Graduate Student, Department of Public Health Sciences, University of Alberta.

THESIS SUPERVISOR: Cameron Wild, PhD, Assistant Professor, University of Alberta. Phone: 492 9414

PURPOSE OF THE PROJECT: The purpose of this research study is to look at what parents think about the risks of childhood injuries and what may stop children from being hurt.

PROCEDURES: As a parent or caregiver you will be asked to complete a questionnaire. This will take about 10 to 15minutes. The completed questionnaires can then be placed in a sealed envelope supplied and then dropped off in the box provided at the desk.

BENEFITS AND RISKS: There may be no direct benefits or risks to you as a participant of this study. The knowledge gained about childhood injuries may help benefit other children and parents in the prevention of injuries.

CONFIDENTIALITY: No names will be attached to the questionnaire. The information will be kept in a secure area (i.e. locked filing cabinet). The information gathered for this study may be looked at again in the future to help us answer other study questions. If so, the ethics board will first review the study to ensure the information is used ethically.

FREEDOM TO WITHDRAW: You are free to refuse to take part in this study. You are free to refuse to answer any questions for this study. If you do not want to take part in this study your child's care will not be affected in any way. If you feel any distress or upset because of the survey there are people on the unit who you can talk to, e.g. a nurse or a social worker.

Thank you for considering taking part in this study.

Sincerely,

_____

Graduate student,
University of Alberta.

Appendix D
ICD-9 Codes

INJURY AND POISONING (800-999)
Fractures (800-829)
Dislocation (830-839)
Sprains and Strains of joints and adjacent muscles (840-848)
Intracranial injury, excluding those with skull fracture (850-854)
Internal injury of chest, abdomen, and pelvis (860-869)
Open wound of head, neck, and trunk (870-879)
Open wound of upper limb (880-887)
Open wound of lower limb (890-897)
Injury to blood vessels (900-904)
Late effects of injuries, poisonings, toxic effects, and other external causes (905-909)
Superficial injury (910-919)
Contusion with intact skin surface (920-924)
Crushing injury (925-929)
Effects of foreign body entering through orifice (930-939)
Burns (940-949)
Injury to nerves and spinal cord (950-957)
Certain traumatic complications and unspecified injuries (958-959)
Poisoning by drugs, medicinal and biological substances (960-979)
Toxic effects of substances chiefly non-medical as to source (980-989)
Other and unspecified effects of external causes (990-995)
Complications of surgical and medical care, not elsewhere classified (996-999)

Appendix E
Injuries reported by the respondent

Respondent	Injury(s) reported
1	Broken bones
2	Fracture
3	Fractured T12 and L1
4	Crushed spleen
5	Two broken bones in lower right leg
6	Broken heels and dislocated hip
7	Injury to right eye
8	Head injury
9	Head injury
10	Fracture right femur
11	Deep bruised ankle
12	Broken leg
13	Head injury
14	Dislocated arm
15	Foot injury
16	Cut on the head
17	Gash to head
18	(No response)
19	Fractured and dislocated left humeral head
20	Broken arm
21	Injured leg
22	Liver laceration
23	Broken right femur
24	Head injury
25	Knee ligament tear
26	(No response)
27	Broken femur
28	Cut finger
29	Cut hand
30	Concussion and injured kidney
31	Broken leg and arm
32	Fractured skull and epidural haematoma
33	Two broken femurs and broken pelvis
34	Hematoma to chin with restriction of airway
35	Fractured skull
36	Broken leg
37	Fractured wrist
38	Crushed spleen, bruised liver and fractured pancreas
39	Broken right leg, facial scratches
40	Broken leg
41	Bit bottom lip
42	Broken arm

Respondent	Injury(s) reported
43	Broken ankle
44	Broken leg
45	Collapsed lung
46	Ruptured spleen
47	Two broken legs
48	Broken pelvis, sliced liver, scrapes, bruises and road rash
49	Head injury
50	Fractured skull, bruised leg
51	Broken left leg and right collar bone
52	Right foot injury
53	Broken arm and damage to right socket
54	Broken arm
55	Head injury
56	(No response)
57	Broken ankle bone
58	Broken humerus
59	Calf ripped open
60	Tore part of the foot off
61	Fracture left great toe
62	Fractured skull, shock, fractured arm, road rash and facial injury
63	Broken ankle
64	A big gouge on leg
65	Broken leg, ankle
66	Broken leg
67	Facial injury
68	Wrist injury
69	Fractured ankle
70	(No response)
71	Broken fingers and hand
72	(No response)
73	Broken ankle
74	Broken arm
75	Fell off bike
76	Possible broken left wrist
77	Broken ankles, broken fingers
78	Ankle injury
79	Fell down stairs
80	Burn

CHAPTER 5

General Discussion and Conclusions

Overview

The purpose of this thesis was to describe the rates of injury in children of different socio-economic status (SES), and to look at the parent's perceptions of the risk of childhood injury and their use of safety measures. The first paper was a systematic review of the literature pertaining to poverty and childhood injury. Following this review seven research questions were examined in two separate studies. The first study addressed the following: (1) the relationship between childhood injuries and the child's SES in Alberta, (2) the rates of childhood injury in children of different SES, (3) a comparison of the number of childhood injuries of those living in rural and urban communities, and (4) a comparison of the number of childhood injuries of those living in the two major cities of Alberta: Edmonton and Calgary. The second study addressed the following: (1) the most common parental perceptions of the risk factors for childhood injury, (2) the safety measures parents use to prevent childhood injury, and (3) the relationship between selected SES indicators and parental perceptions of the risk factors for childhood injury and the safety measures taken by parents.

The findings from the first study, which analysed provincial healthcare data provided by Alberta Health and Wellness, indicate there is a relationship between SES and the types of childhood injury. The majority of previous research studies performed throughout developed countries supported this finding. Relationships were found between children living in rural and urban residences and SES: specifically, a greater rate of urban children utilising healthcare premium subsidies experienced an injury. In

addition, there was a relationship between SES and children living in the two major cities of Alberta: a greater rate of children with subsidised healthcare living in both Edmonton and Calgary saw a physician for an injury than unsubsidised children. Overall, a greater rate of children presented with an injury in Edmonton compared with Calgary.

The second study, which took place in the Stollery Children's Hospital in Edmonton, suggested that SES was not a factor in parental perceptions of risk factors for childhood injury. Additionally, the participants had similar knowledge about the risk of childhood injury and their preventability despite differences in household income.

This final chapter will draw some links between the two studies. The limitations of the studies will be discussed. Implications of this research will be discussed with a view to the exploration of possible research strategies and practices. Lastly, conclusions will be drawn about the findings of this research study.

Comparison Between the Data Sets

The initial study was a secondary analysis performed on data from the Alberta Provincial health administrative database during one fiscal year. The second study investigated children admitted to a tertiary healthcare centre in Edmonton, Alberta with an unintentional injury during a five-month period. To help validate the information obtained from the two studies a comparison was made between the two data sets on the common groups of data: gender, age groups, place of residence, types of injury, and SES (using healthcare subsidy as a proxy in the Alberta Health and Wellness data, and annual household income in the hospital data). A chi-squared distribution (level of significance <0.05) was then performed to compare the distribution of frequencies in the

sample (hospital data) to the distribution in the population (Alberta Health and Wellness data) for each of the common groups of data.

Gender

Similarities were found when comparing the gender between the two data sets, Alberta Health and Wellness (AHW) and the Stollery Children's Hospital. Table 5-1 illustrates that in both data sets more males than females presented with an injury.

Table 5-1
Gender Comparison

	AHW		Hospital	
Gender	**N**	**%**	**N**	**%**
Male	102445	56.1%	55	68.8%
Female	80313	43.9%	25	31.2%

Age Groups

Table 5-2 compares the age groups of the children who presented with an injury. It demonstrates that in both data sets the under one year old child was least likely to present with an injury, and the 10 to 14 year olds were most likely to consult a physician when injured.

Table 5-2
Age Group Comparison

	AHW		Hospital	
Age Group	**N**	**%**	**N**	**%**
Less than 1 year	2226	1.2%	1	1.3%
1 to 4 years old	38886	21.3%	20	25%
5 to 9 years old	43516	23.8%	13	16.3%
10 to 14 years old	59589	32.6%	40	50%
Over 14 years	38541	21.1%	6	7.5%

Place of Residence

Table 5-3 show similarities were evident when the place of residence was compared between the two data sets, in both, about one quarter of the children were from rural communities.

Table 5-3
Place of Residence Comparison

	AHW		Hospital	
Place of residence	**N**	**%**	**N**	**%**
Urban	135925	74.4%	58	72.5%
Rural	46823	25.6%	22	27.5%

Types of injury

In comparing the types of injury between the two data sets there appeared to be no similarities as demonstrated in Table 5-4. These differences could be explained by the restrictive nature of the second study as it was confined to a specific site, a tertiary centre, and was biased by factors such as severity, accessibility and low numbers.

Table 5-4
Types of Injury Comparison

	AHW		Hospital	
Type of Injury	**N**	**%**	**N**	**%**
Fractures	16411	9%	40	50%
Dislocations, sprains and strains	46134	25.2%	6	7.5%
Intracranial injury	5232	2.9%	1	1.3%
Internal injury of chest, abdomen and pelvis	195	0.1%	6	7.5%
Open wounds	36959	20.2%	9	11.3%
Injury to blood vessels	101	0.1%		
Superficial injury and contusions	44246	24.2%	12	15%
Crushing injury	2468	1.4%		
Foreign body	4608	2.5%		
Burns	4664	2.6%	1	1.3%
Injury to nerves and spinal cord	151	0.1%		
Poisoning	3988	2.2%		
Others	17601	9.6%		
Uncodeable			5	6.3%

Socio-economic status

Table 5-5 demonstrates, that in both data sets, between 16% and 23% of the children who presented to a physician with an injury were from a lower socio-economic status group.

Table 5-5
SES Comparison

	AHW		Hospital	
SES	**N**	**%**	**N**	**%**
Lower SES	42097	23%	13	16.3%
Higher SES	140661	77%	65	83.3%

Relationship Between Data Sets and Dependent Variables

Table 5-6 illustrates the results of a chi-square test performed on the data using AHW data (the norm) and the hospital data (sample) as the independent variable, and the gender, age groups, place of residence, type of injury, and SES as the dependent variables. The results show evidence that the distribution in the hospital data was similar to the population data when gender, age groups and types of injury were compared ($p < 0.05$). There was no evidence of similarities present with regard to place of residence or SES ($p > 0.05$).

Table 5-6
Chi-square test

Dependent Variables	χ^2	***P* value**
Gender	5.198	0.023
Age groups	16.874	0.002
Place of residence	0.152	0.697
Type of injury	610.01	<0.001
SES	1.767	0.184

No definitive conclusions can be made with the comparison of these two data sets. The hospital data has some biases; firstly, it was a small sample size and was based

solely on a voluntary questionnaire, secondly, the researcher was unable to validate the responses due to the anonymity of the questionnaire, and lastly, the data collection was restricted to a tertiary centre where a large number of severe injuries are treated. Therefore, generalisations cannot be made with these comparisons because of the weaknesses present in the hospital data.

Limitations

The researcher recognises that both these studies had limitations. There is continued debate as to the most appropriate measure of SES. Factors to consider include: what information can accurately and cost-effectively be obtained, and, what information is needed to test the relationship between SES and childhood injuries? The most frequently used measures of SES are parental occupation, income and education. It is assumed that parents with professional occupations have, in general, higher incomes and therefore have more material resources to provide their child with safety needs, for example, a bicycle helmet. Additionally, with higher incomes comes the ability to reside in well-maintained houses, located in quieter neighbourhoods with adequate play areas and less traffic. Parental education, used synonymously as intelligence, also plays a role in child safety; intuitively a parent with more education has a better ability to assess the needs of their child and keep it safe. However, it is recognised that not all measures of parental occupation and income are related to education. (Health Canada, 1999). In conclusion, to capture an accurate measure of SES, a system where parental occupation, income and education are assessed should be implemented.

The variables used to measure SES vary greatly from study to study. Canadian studies found in the literature review used a variety of SES indicators; most looked at

the percentage of individuals living below the poverty level by examining census data (Brownell et al., 2002; Faelker et al., 2000; Dougherty et al, 1990; Joly et al., 1989; and Pless et al., 1987). Other SES 'proxy' variables used in Canadian studies include: education, household income and occupation (Root, 1996), education and household income (Alberta Safe Kids Campaign, 1994; and Larson et al., 1988), and measure of family affluence (Pickett et al., 2002). In addition, most other countries have been shown to use a variety of SES indicators. However, the majority of studies originating in Great Britain have utilised the Townsend score when discussing SES (e.g., Hippisley-Cox et al., 2002; Lyons et al., 2000; Laing et al., 1999; Reading at al., 1999; etc.). This deprivation index asks questions about employment, accommodation and car ownership. Consequently, this has led to some consistency in British studies.

The SES indicator in both of the studies in this thesis was based on individual income. Healthcare subsidy was used as a proxy for SES in the Alberta Health and Wellness study; this was the only SES variable present in the data and was based on the annual household income. Despite the possibility of slight biases (Treaty Status and the "near poor" in the AHW data) this individual measure of SES is more accurate than using an aggregate measure.

The information obtained from AHW may present a false picture about the number of injuries; some minor incidents may be treated at home because of monetary constraints (transportation or babysitting problems, time off work), language barriers, and distrust of the healthcare system or perceived discrimination. Also, for other minor incidents, treatment may be sought from a physician due to ignorance in how to treat simple injuries at home. In addition, not all injuries require medical attention and are

treated at home. The injuries reported by the respondents in the second study may not be a true representation of the sample of the children brought into the hospital for an injury because of the self-selection of completing a voluntary questionnaire.

While the limitations of these databases have been acknowledged, various strengths are apparent in this study. The opportunity to examine a large, individual database with no expense involved has been invaluable. The open-ended questions of the second study encouraged participants to express their concerns about their home and neighbourhood safety as well as think about what information they would like to keep their children safe. These questions allowed for a more comprehensive study to be performed.

Implications

This study has provided an insight and understanding into how SES influences the incidence of unintentional childhood injuries as well as the parental perceptions of injury and the safety measures taken. This knowledge could ultimately lead to strategies to enhance the barriers to injury prevention.

Research strategies

First, a determinant of health approach is crucial to injury research. As it is concluded that children living in poverty are more at risk from certain injuries in Alberta then further research should be performed to find out the needs of low-income families in order to prevent these childhood injuries.

Both urban and rural children have different exposure risks to injury. The Capital and Calgary Health Authorities reported significantly lower motor vehicle collision mortality rates than provincial average, while the majority of the rural health authorities

reported significantly higher than provincial average (Alberta Health and Wellness, 2000). The province of Alberta has the second highest rate of deaths due to motor vehicle collisions in the country, with most involving teenage and young adult males.

In addition, children living in poverty in rural districts may be exposed to farming hazards; Wilk (1993), suggested that children often work in agriculture because of economic pressures. Children are brought into the fields because of few accessible and/or affordable daycares; they are exposed to farm machinery, pesticides and unsafe transportation. Alberta still allows farmers to transport people in the back of pick-up trucks. Is there a culture differential between urban and rural families? Are rural children given more freedom to explore without adequate adult supervision than their urban counterparts? Do young urban children living in poverty come home to an empty house after school because their caregiver is working long hours compared to a rural child whose parent may be working in the house or nearby field? Additionally, children living in urban areas are exposed to different hazards if they live in poverty. These may include falling from high places, primarily windows (Bergner et al, 1995), and living in areas with high traffic density and lack of safe play areas. Though urban children living in poverty were shown to have more injuries both groups of injury risks should be addressed after further research has demonstrated exactly what influences these types of injury.

Additional research into the relationship between childhood injury and SES needs to look at the causes of the injury. Although information on the type of injury is important, the root cause will provide insight and form a basis for preventative measures to be adopted. The national adoption of the Canadian Hospitals Injury Reporting and

Prevention Program (CHIRPP), a computerised system that collects information on children who present to the emergency department, would provide a reliable data collection tool. This questionnaire includes demographic details, injury prevention methods used and narrative text providing details of the events leading up to the injury episode. This information could highlight risk behaviours and circumstances that lead to the injury and therefore would be useful in targeting injury prevention programmes.

The data from Alberta Health and Wellness has yielded interesting results. This data and data from subsequent years should be made readily available to other researchers in order to detect any patterns and trends in childhood injury in Alberta.

Policy strategies

Policy makers need to be aware of the issues related to SES and the incidence of childhood injury. The information obtained from the Alberta Health and Wellness data should be offered back to the administrators, as well as to Health Canada, to aid with provincial and federal policy discussions on the prevention of childhood injury.

A collaborative, national research team that focuses on injury should look at the needs of specific populations; for example, the types and mechanisms of injury from various socio-economic groups. Prevention strategies that work with a higher SES population are unlikely to work with people living in poverty or the "near poor". Educational interventions alone may prove to be ineffective, and legislative measures that provide a safer environment and less injury producing agents need to be examined. This could lead to injury prevention programme planners encouraging the passage of national legislation regarding childhood safety instead of provinces legislating different laws at various times, for example, bicycle helmets. Sweden has demonstrated what a

successful, national programme for child accident prevention can achieve with "a growth of general safety consciousness in large parts of the community" (Berfenstam, 1995, p.69) as well as other safety factors.

Furthermore, the primary data collection on the cluster sample gave the researcher an insight into the attitudes and perceptions of risks by parents about childhood injuries and the use of safety measures. Even though perceptions of the risk of childhood injury were similar despite the SES of the families, there exists a need for more information about injury especially aimed at the child's level of understanding. This information should be offered to "KIDS SAFE", situated in the Stollery Children's Hospital. It may assist the organisation with injury prevention programmes and also be a guide as to what information is informative to both parents and children in hospitals, schools, libraries and local communities.

The introduction of 17 different healthcare authorities in Alberta, and the federal government's decision to give the provincial government more autonomy in healthcare spending has naturally led to different healthcare priorities. The data analysis demonstrated a difference in the rate of childhood injuries in Edmonton and Calgary among children living in poverty. Ideally, influence should be employed to prioritise a solution to these problems by the relevant health authorities as well as the local within-city communities. Any strategy examined and implemented by the community needs to be evaluated to ensure it is meeting the needs of the intended population.

In conclusion, the population of Canada is diverse. Any strategies adopted to improve health and prevent injury must be flexible and planned as a population-based approach.

Concluding Remarks

Progress has been made; children are increasingly safe from unintentional injuries in Canada, with the rate decreasing in recent years. However, more can be done to ensure the safety of our children. "Society needs to recognise that most injuries are not "accidents", but predictable and preventable events which require action on all levels (family, community and society)." (Canadian Institute of Child Health, 2000, p.58).

As adults we have a responsibility to keep children safe and free from danger. Sweden has been a pioneer in child injury prevention having recognised injury as a concern in the 1950's (Berfenstom, 1995). In the 1990's the Swedish government accepted the UN Convention of the Rights of the Child where all children are assured of the right to live in an environment where they are safe from disease and injury. The lasting recognition of this concern has resulted in a reduction of unintentional childhood injuries. It is time for Canadians to recognise and act on this problem. However, if we expect equitable health outcomes for our children then we must correct the imbalance and aim to eliminate the effects of child poverty. A count of homeless persons in Edmonton in March 2000 found 1125 homeless; this included 76 families, encompassing 117 children (Edmonton Community Plan on Homelessness, 2000). What hope have these children in reaching adulthood without encountering an injury?

Therefore, in attempting to analyse and prevent childhood injuries, knowledge about the "who" as well as the "what" is important. Injury imposes a great burden on modern society; there is an enormous loss of human potential to Canada in the form of years of life lost, quality of life, and costs to the healthcare system.

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